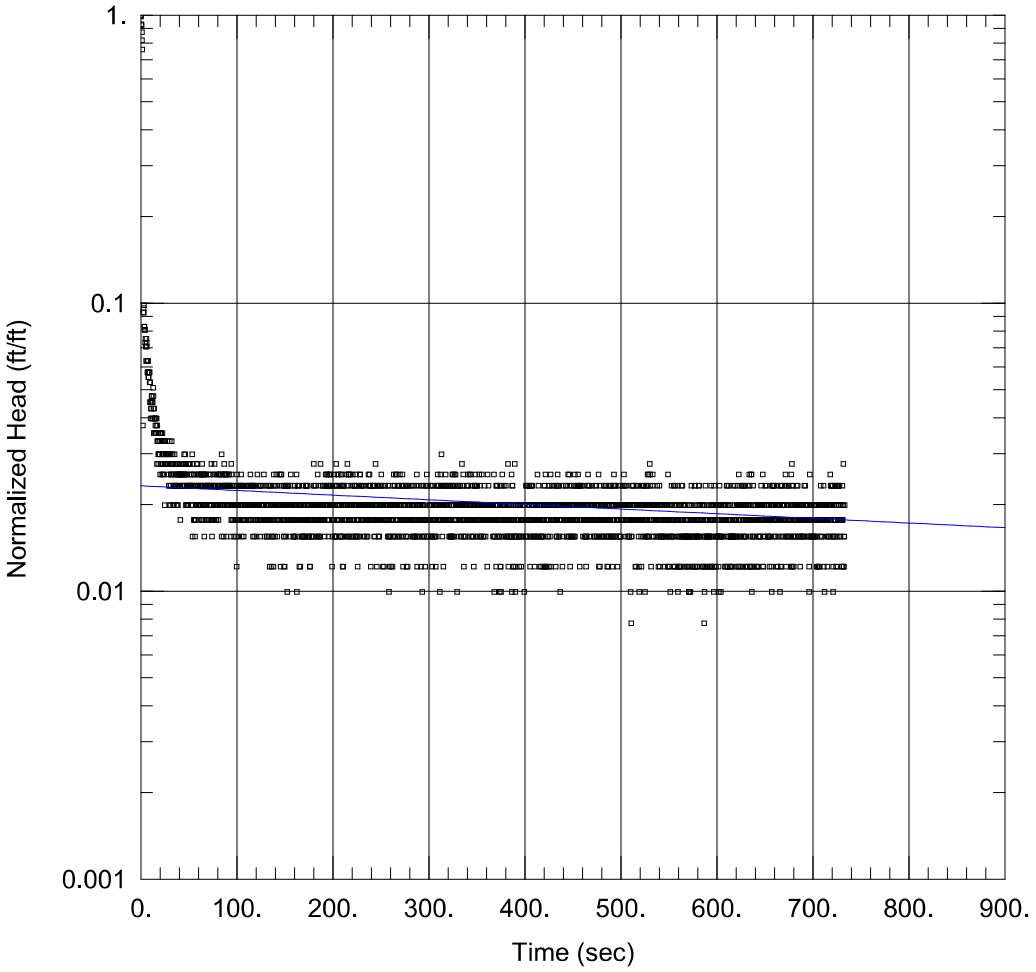
Appendix E

Slug Test Analyses



MW-1B (FH1)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-1B
Test Date: 10/13/2020

AQUIFER DATA

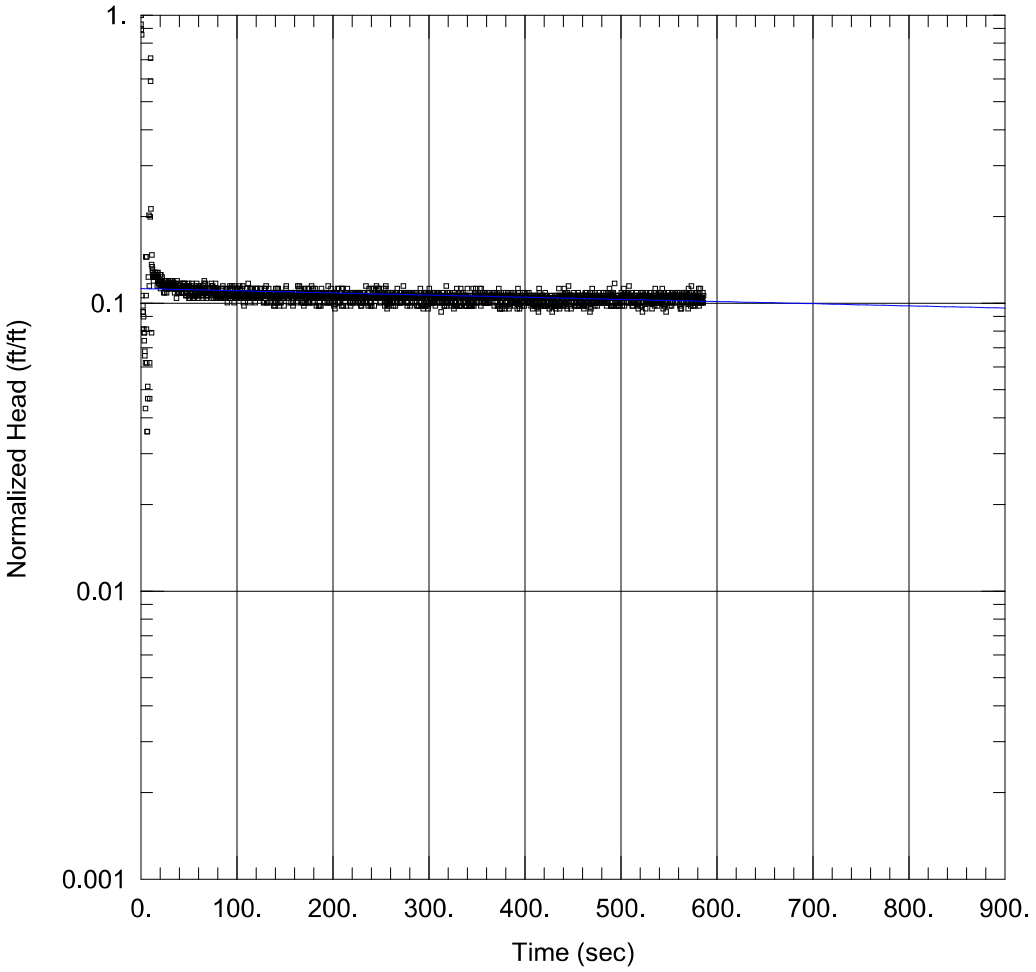
Saturated Thickness: 10.98 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1B)

Initial Displacement: 0.905 ft
Total Well Penetration Depth: 10.98 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.98 ft
Screen Length: 10.98 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.8E-5 cm/sec
y0 = 0.021 ft



MW-1B (FH2)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-1B
Test Date: 10/13/2020

AQUIFER DATA

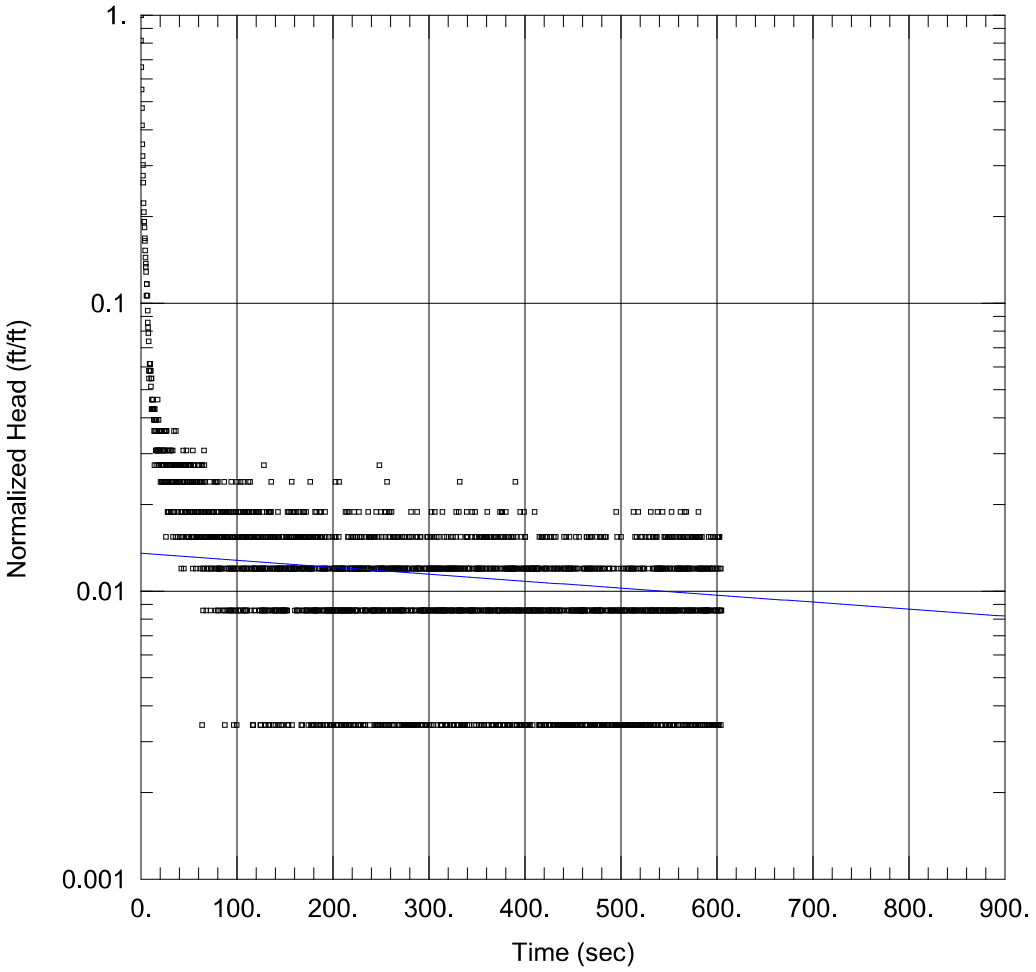
Saturated Thickness: 10.98 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1B)

Initial Displacement: 0.837 ft
Total Well Penetration Depth: 10.98 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.98 ft
Screen Length: 10.98 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
K = 1.3E-5 cm/sec
Solution Method: Bouwer-Rice
y0 = 0.094 ft



MW-1B (RH1)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-1B
Test Date: 10/13/2020

AQUIFER DATA

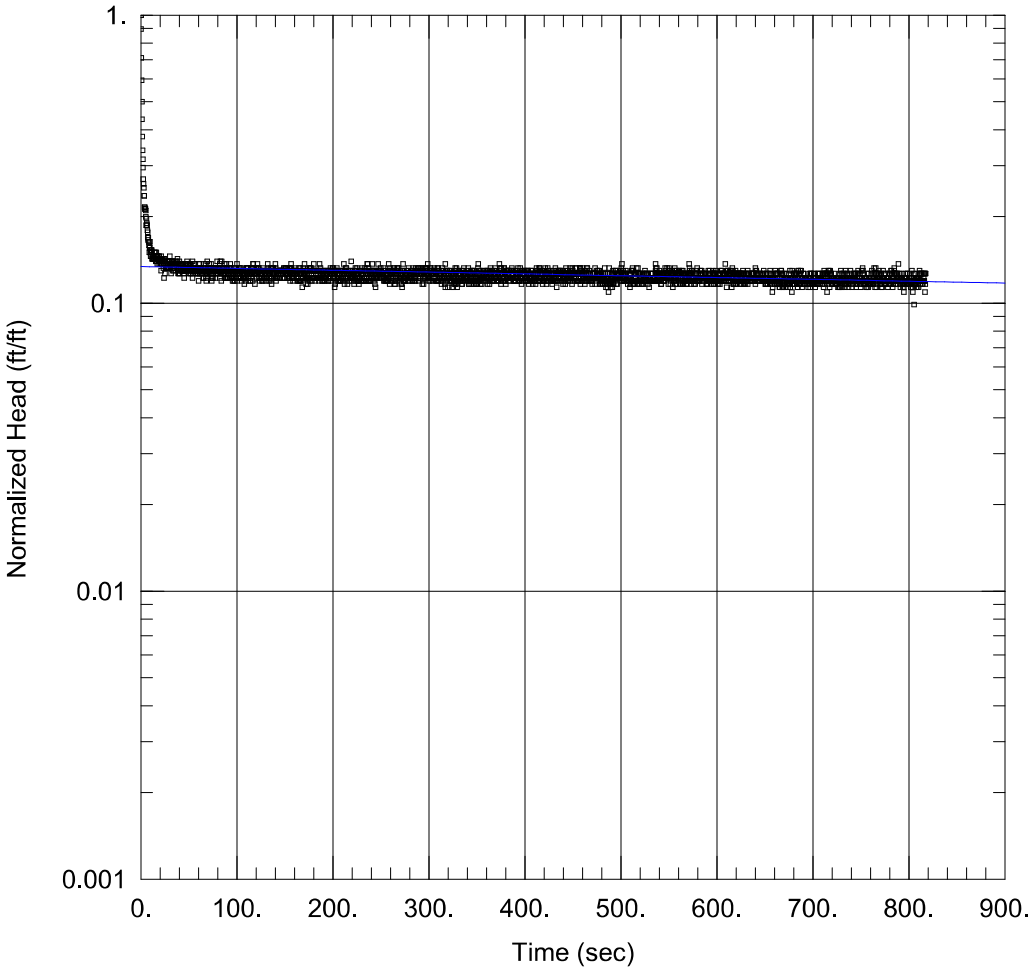
Saturated Thickness: 10.98 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1B)

Initial Displacement: 0.584 ft
Total Well Penetration Depth: 10.98 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.98 ft
Screen Length: 10.98 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.2E-5 cm/sec
y0 = 0.0079 ft



MW-1B (RH2)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-1B
Test Date: 10/13/2020

AQUIFER DATA

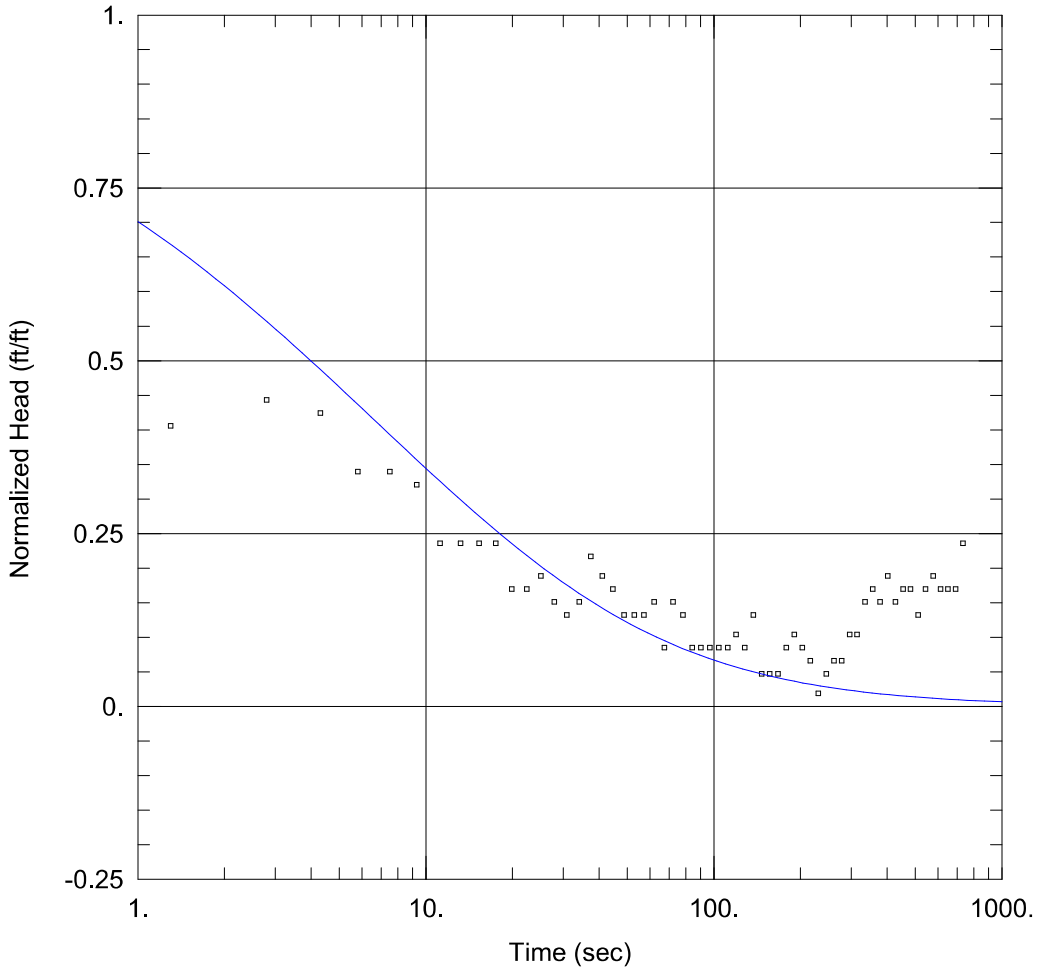
Saturated Thickness: 10.98 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1B)

Initial Displacement: 0.687 ft
Total Well Penetration Depth: 10.98 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.98 ft
Screen Length: 10.98 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.1E-5 cm/sec
y0 = 0.092 ft



MW-2B (FH1)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-2B
Test Date: 10/12/2020

AQUIFER DATA

Saturated Thickness: 15. ft

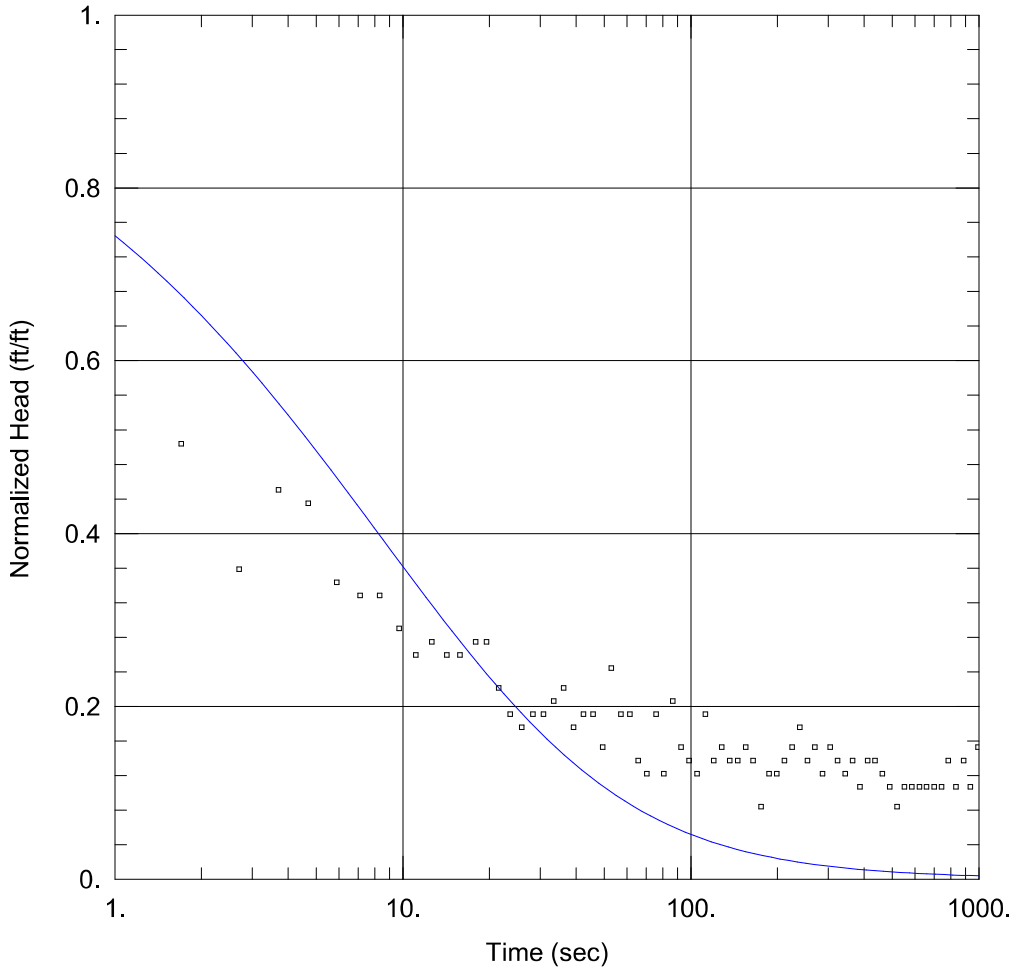
WELL DATA (MW-2B)

Initial Displacement: 0.106 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.0833 ft
Static Water Column Height: 14.09 ft
Screen Length: 10. ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.00071 cm/sec
Kz/Kr = 1.
Ss = 0.0047 ft^{-1}



MW-2B (FH2)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-2B
Test Date: 10/12/2020

AQUIFER DATA

Saturated Thickness: 15. ft

WELL DATA (MW-2B)

Initial Displacement: 0.131 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.0833 ft

Static Water Column Height: 14.09 ft
Screen Length: 10. ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.3

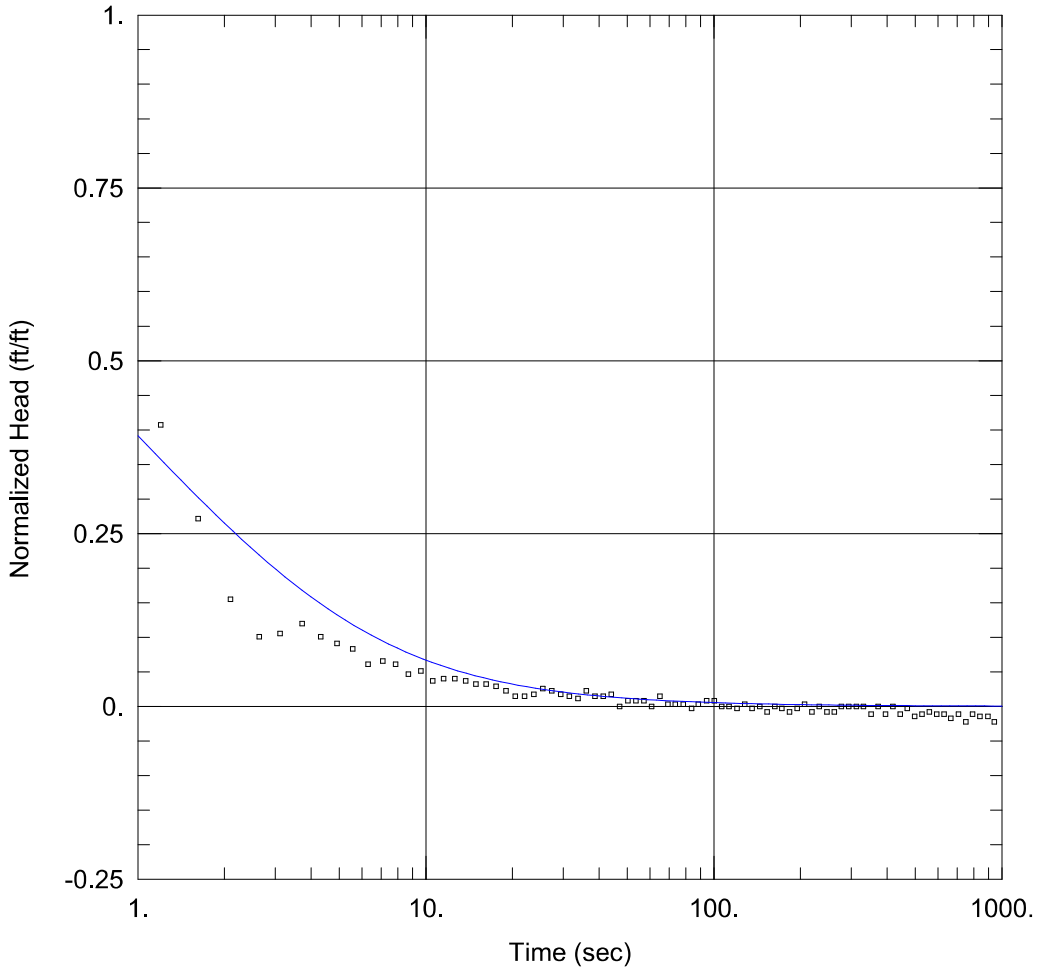
SOLUTION

Aquifer Model: Confined

Kr = 0.0011 cm/sec
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 0.0017 ft^{-1}



MW-2B (RH1)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-2B
Test Date: 10/12/2020

AQUIFER DATA

Saturated Thickness: 15. ft

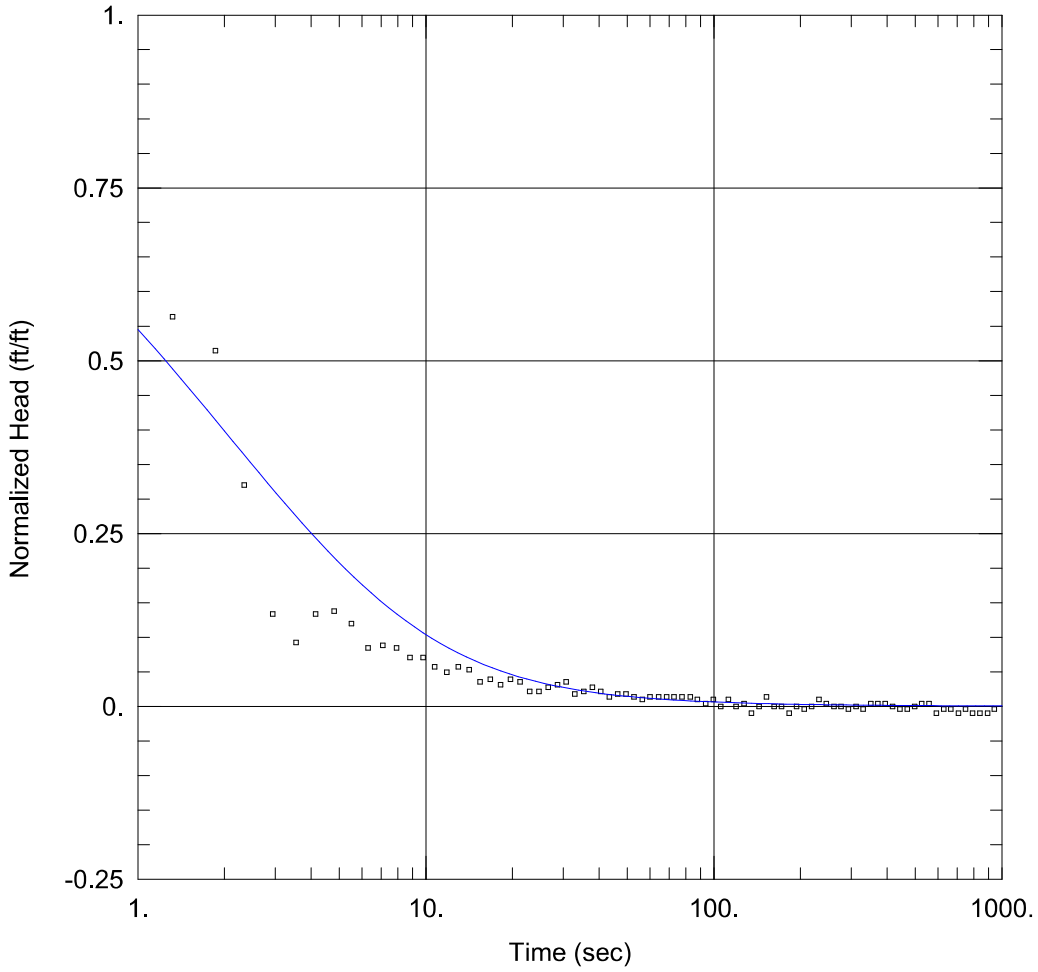
WELL DATA (MW-2B)

Initial Displacement: 0.626 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.0833 ft
Static Water Column Height: 14.09 ft
Screen Length: 10. ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.0083 cm/sec
Kz/Kr = 1.
Ss = 0.0022 ft^{-1}



MW-2B (RH2)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-2B
Test Date: 10/12/2020

AQUIFER DATA

Saturated Thickness: 15. ft

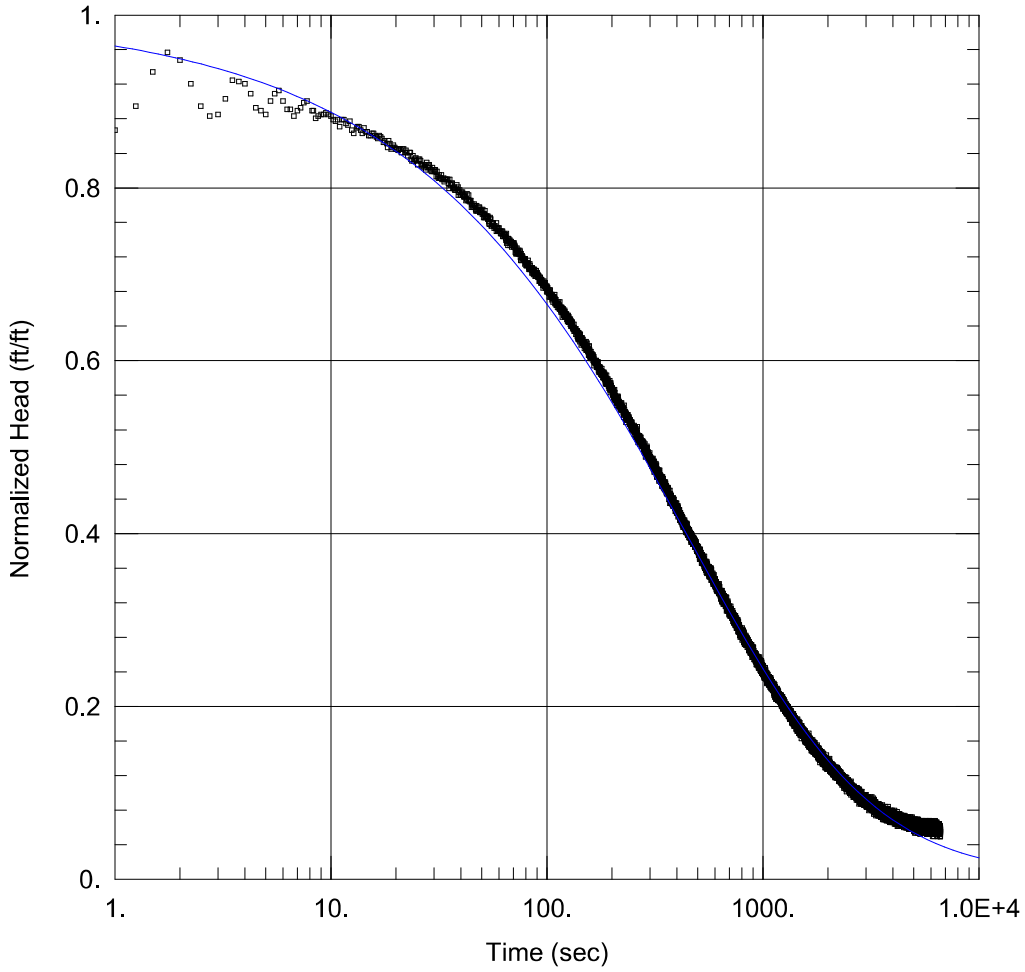
WELL DATA (MW-2B)

Initial Displacement: 0.509 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.0833 ft
Static Water Column Height: 14.09 ft
Screen Length: 10. ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.0067 cm/sec
Kz/Kr = 1.
Ss = 0.00068 ft^{-1}



MW-4B (FH1)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-4B
Test Date: 10/13/2020

AQUIFER DATA

Saturated Thickness: 19.58 ft

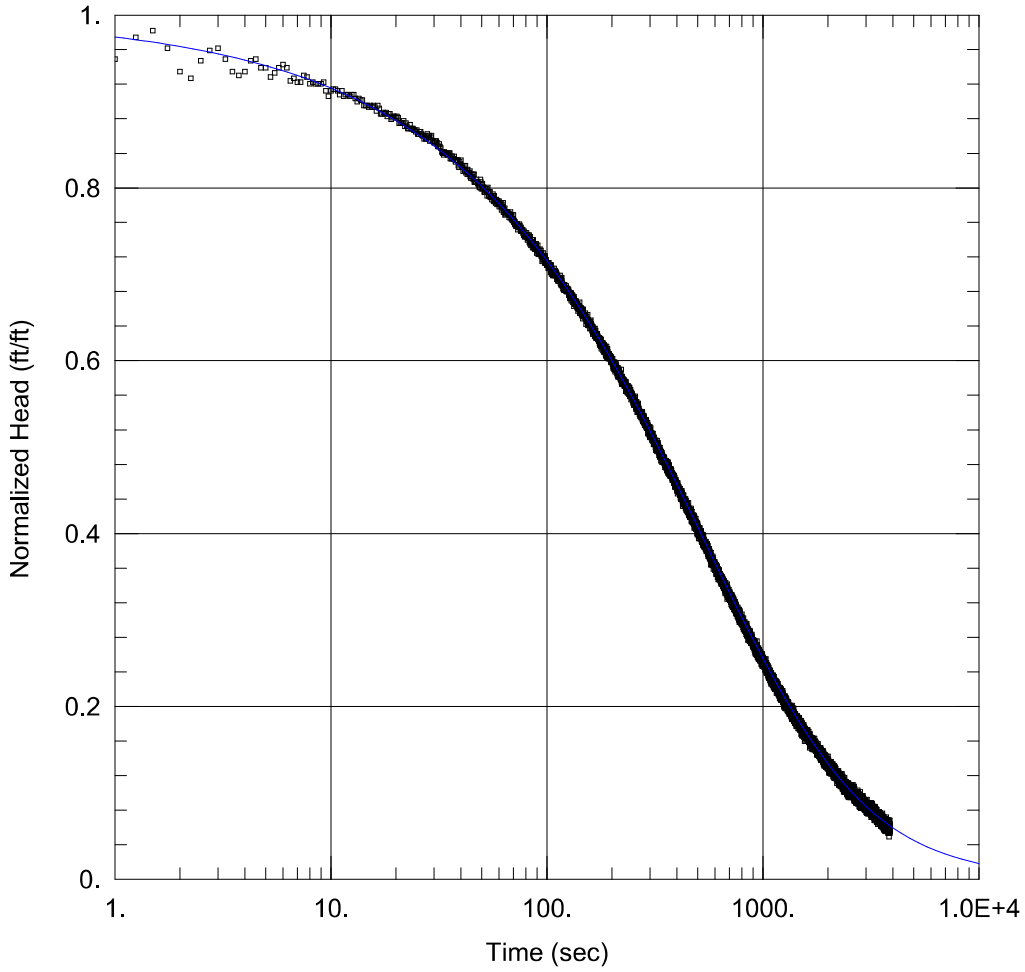
WELL DATA (MW-4B)

Initial Displacement: 1.156 ft
Total Well Penetration Depth: 19.58 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 19.58 ft
Screen Length: 19.58 ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.1E-5 cm/sec
Kz/Kr = 1.
Ss = 0.00078 ft^{-1}



MW-4B (RH1)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-4B
Test Date: 10/13/2020

AQUIFER DATA

Saturated Thickness: 19.58 ft

WELL DATA (MW-4B)

Initial Displacement: 1.119 ft
Total Well Penetration Depth: 19.58 ft
Casing Radius: 0.0833 ft

Static Water Column Height: 19.58 ft
Screen Length: 19.58 ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.3

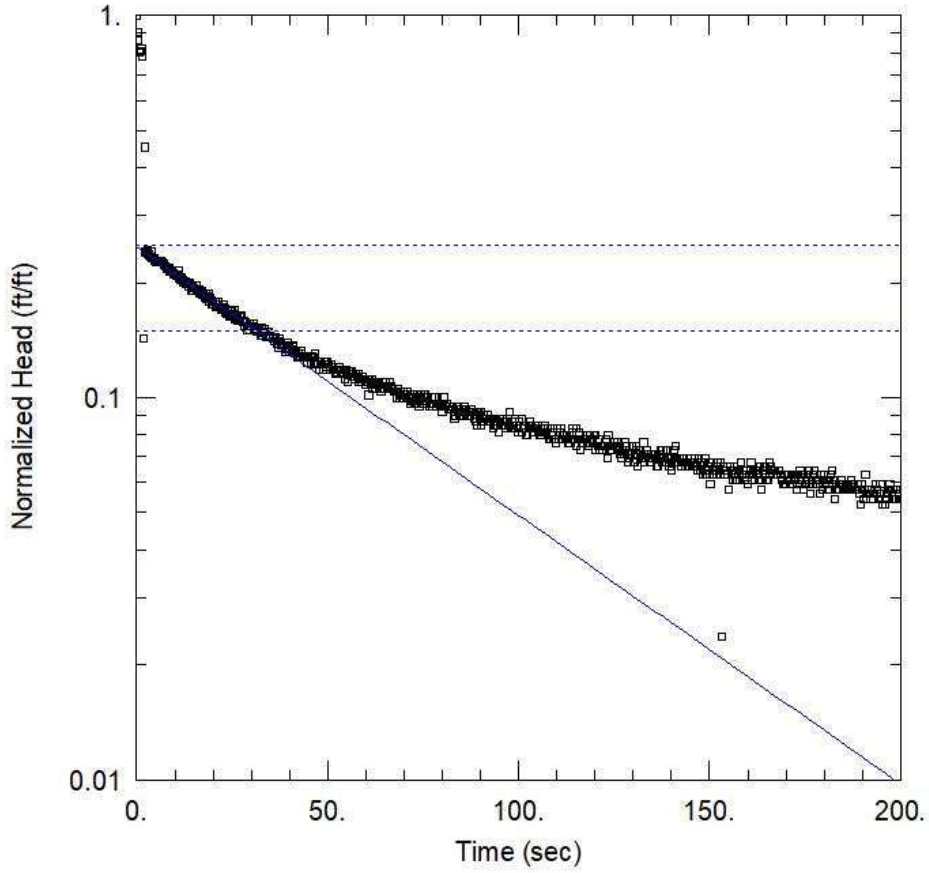
SOLUTION

Aquifer Model: Unconfined

Kr = 1.4E-5 cm/sec
Kz/Kr = 1.

Solution Method: KGS Model

Ss = 0.00029 ft^{-1}



MW-6 FALLING HEAD (SLUG IN)

Data Set:
Date: 10/29/20 Time: 11:21:39

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-6
Test Date: 10/13/2020

AQUIFER DATA

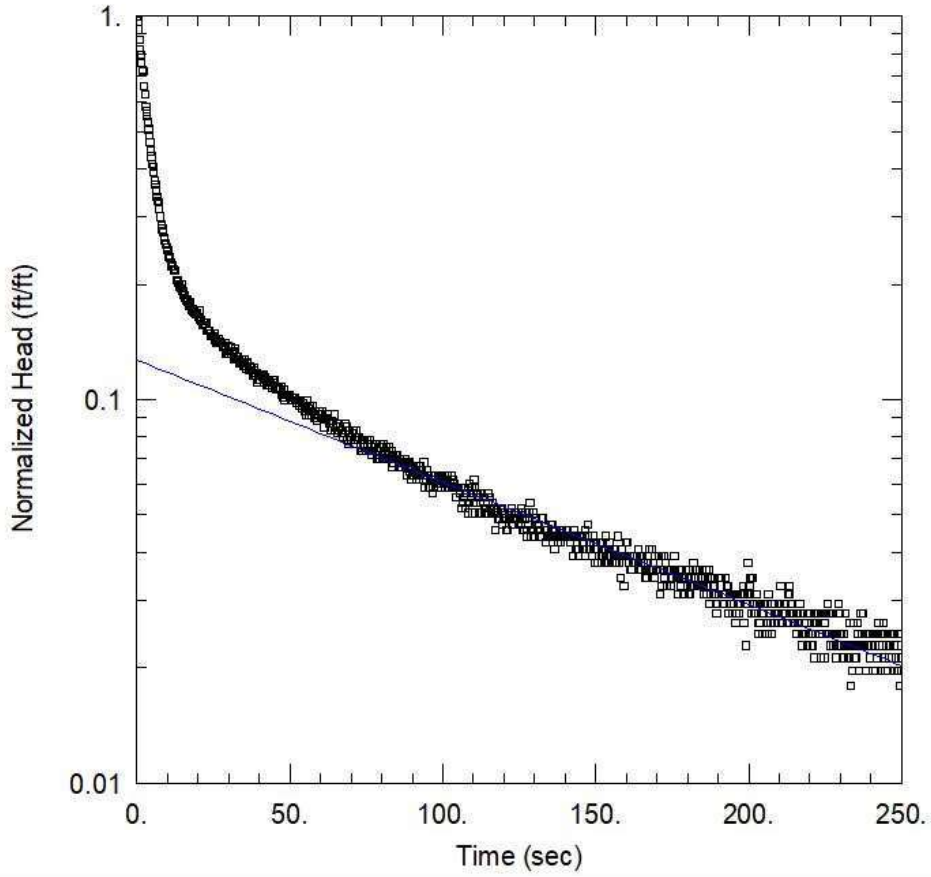
Saturated Thickness: 26.28 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-6)

Initial Displacement: 1.356 ft
Total Well Penetration Depth: 26.28 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 26.28 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.0007013 cm/sec
y0 = 0.3364 ft



MW-6 RISING HEAD (SLUG OUT)

Data Set:
Date: 10/29/20 Time: 11:32:04

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: MW-6
Test Date: 10/13/2020

AQUIFER DATA

Saturated Thickness: 26.28 ft Anisotropy Ratio (Kz/Kr): 1.

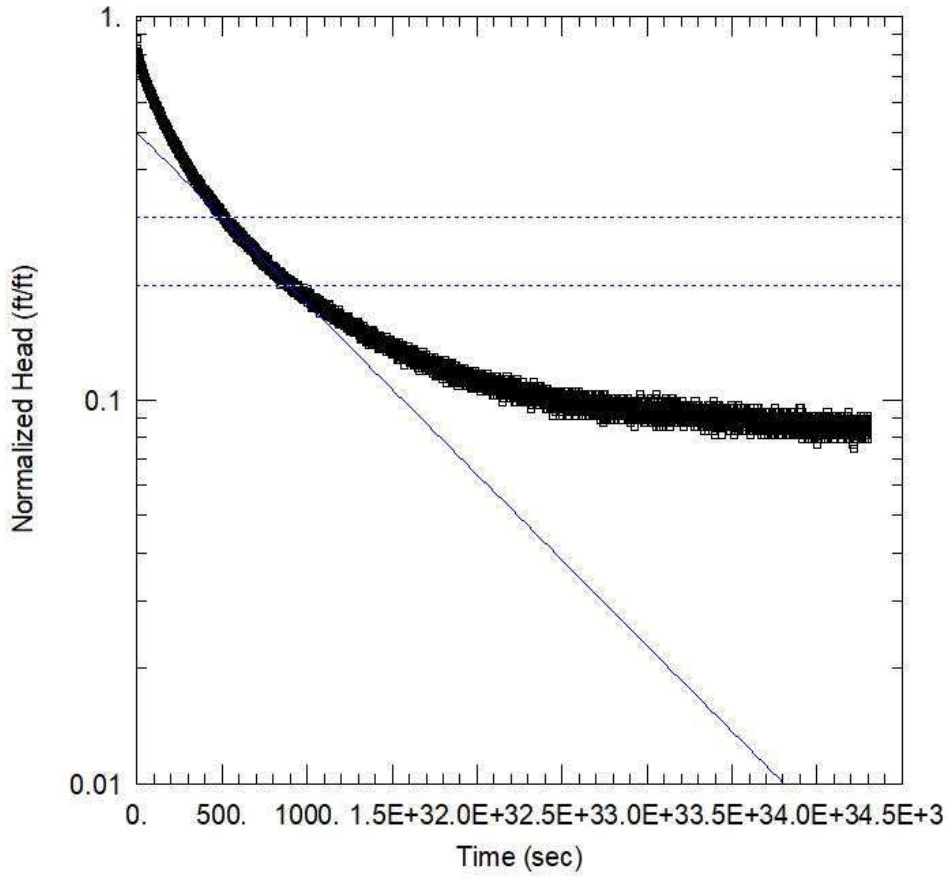
WELL DATA (MW-6)

Initial Displacement: 1.409 ft
Total Well Penetration Depth: 26.28 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 26.28 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.00175 cm/sec y0 = 0.1785 ft



W-2A FALLING HEAD (SLUG IN)

Data Set:
Date: 10/29/20 Time: 09:56:24

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-2A
Test Date: 10/15/2020

AQUIFER DATA

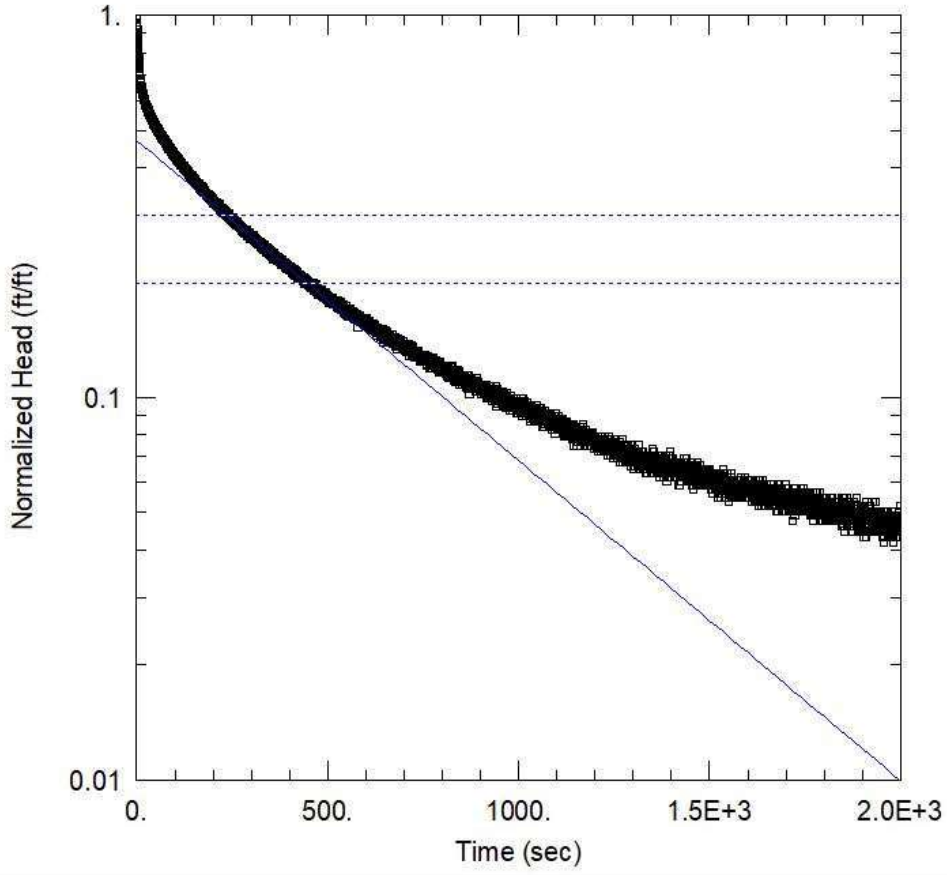
Saturated Thickness: 8.06 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-2A)

Initial Displacement: 1.113 ft
Total Well Penetration Depth: 8.06 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.06 ft
Screen Length: 8.06 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 9.678E-5 cm/sec y0 = 0.5565 ft



W-2A RISING HEAD (SLUG OUT)

Data Set:
Date: 10/29/20 Time: 10:25:11

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-2A
Test Date: 10/15/2020

AQUIFER DATA

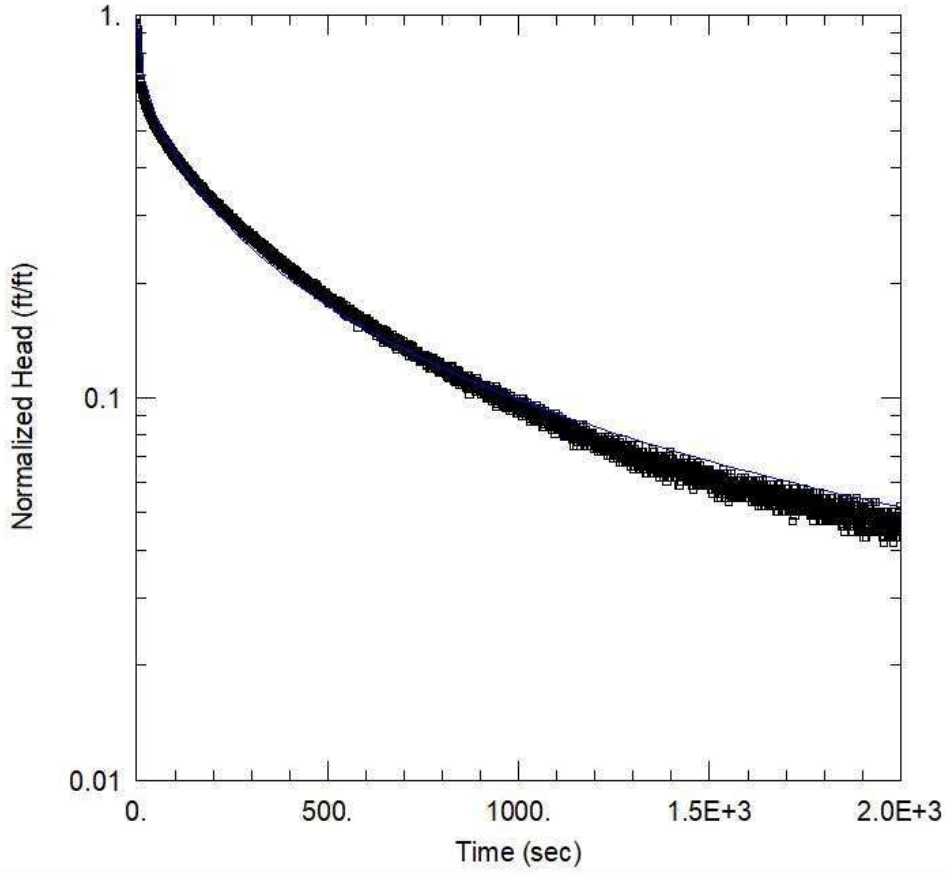
Saturated Thickness: 8.06 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-2A)

Initial Displacement: 1.561 ft
Total Well Penetration Depth: 8.06 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.06 ft
Screen Length: 8.06 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001816 cm/sec
y0 = 0.7356 ft



W-2A RISING HEAD (SLUG OUT)

Data Set:
Date: 10/29/20 Time: 12:51:52

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-2A
Test Date: 10/15/2020

AQUIFER DATA

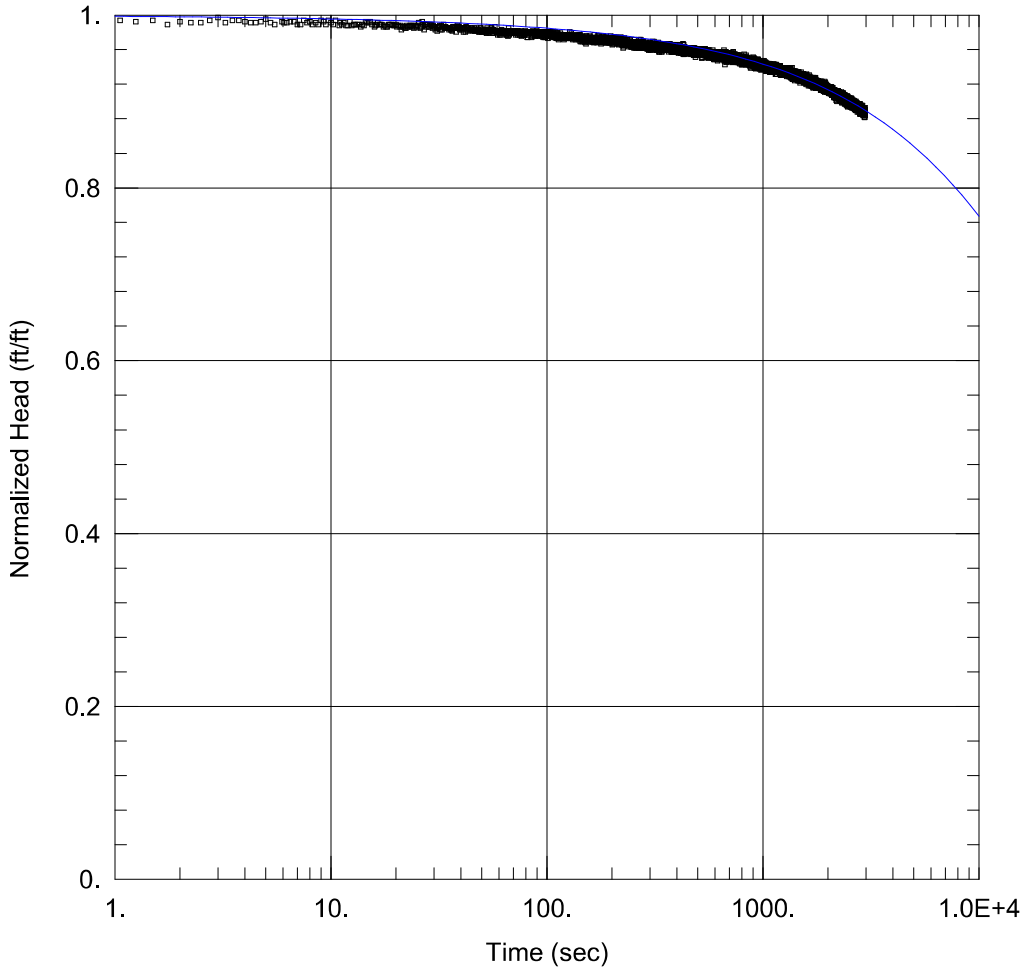
Saturated Thickness: 8.06 ft

WELL DATA (W-2A)

Initial Displacement: 1.561 ft
Total Well Penetration Depth: 8.06 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.06 ft
Screen Length: 8.06 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model
Kr = 5.86E-5 cm/sec
Kz/Kr = 1.
Ss = 0.01241 ft^{-1}



W-2B (RH3)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: W-2B
Test Date: 10/15/2020

AQUIFER DATA

Saturated Thickness: 23.64 ft

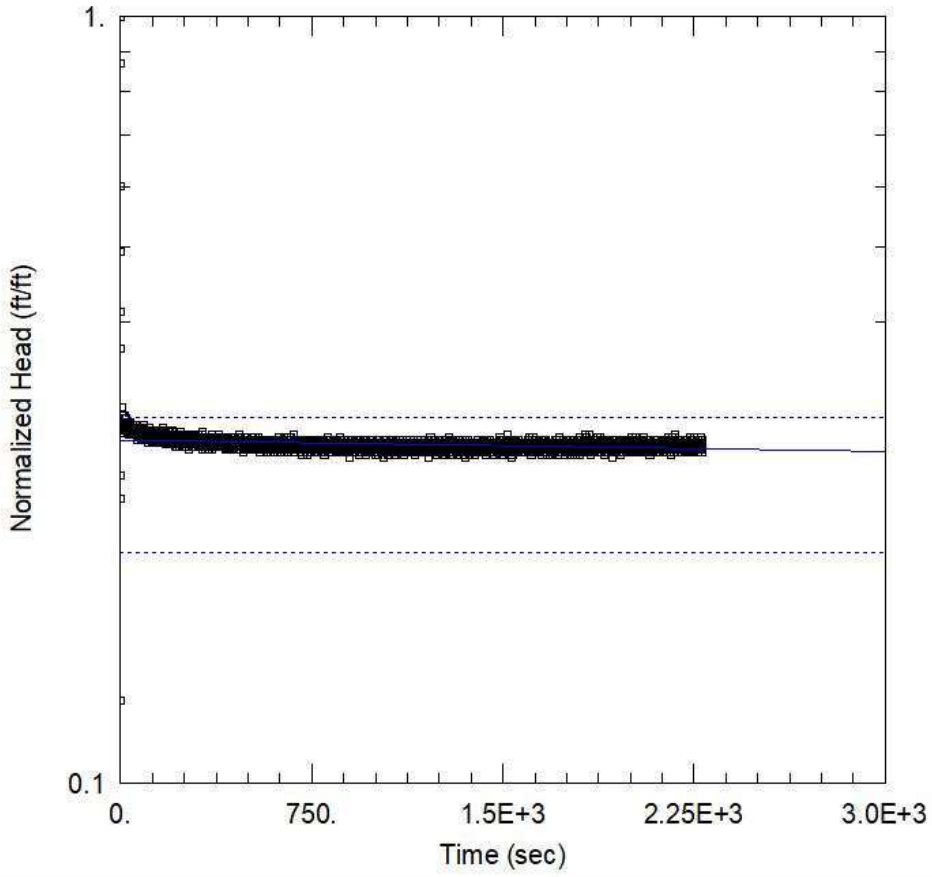
WELL DATA (W-2B)

Initial Displacement: 1.481 ft
Total Well Penetration Depth: 23.64 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 23.64 ft
Screen Length: 20. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.9E-7 cm/sec
Kz/Kr = 1.
Ss = 6.3E-5 ft^{-1}



W-5 FALLING HEAD (SLUG IN) 1

Data Set:
Date: 10/29/20 Time: 08:40:07

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-5
Test Date: 10/14/2020

AQUIFER DATA

Saturated Thickness: 7.07 ft Anisotropy Ratio (Kz/Kr): 1.

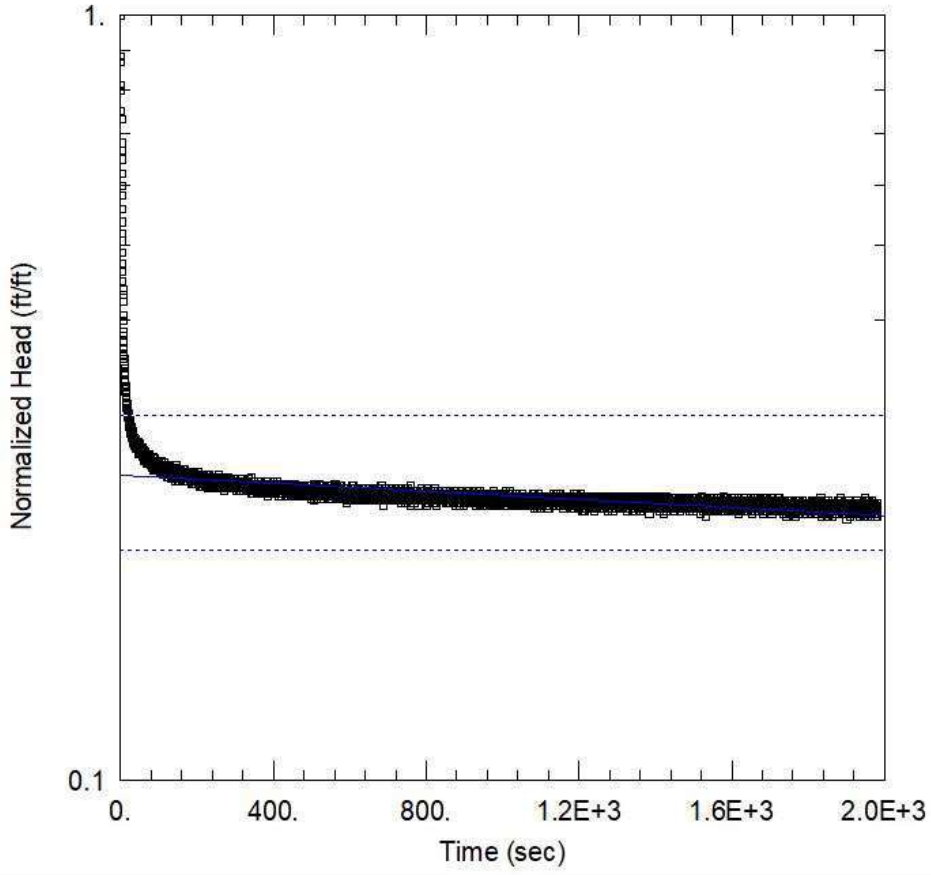
WELL DATA (W-5)

Initial Displacement: 1.111 ft
Total Well Penetration Depth: 7.07 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 7.07 ft
Screen Length: 7.07 ft
Well Radius: 0.3333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 2.127E-6 cm/sec y0 = 0.3111 ft



W-5 RISING HEAD (SLUG OUT) 1

Data Set:
Date: 10/29/20 Time: 09:36:04

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-5
Test Date: 10/14/2020

AQUIFER DATA

Saturated Thickness: 7.07 ft Anisotropy Ratio (Kz/Kr): 1.

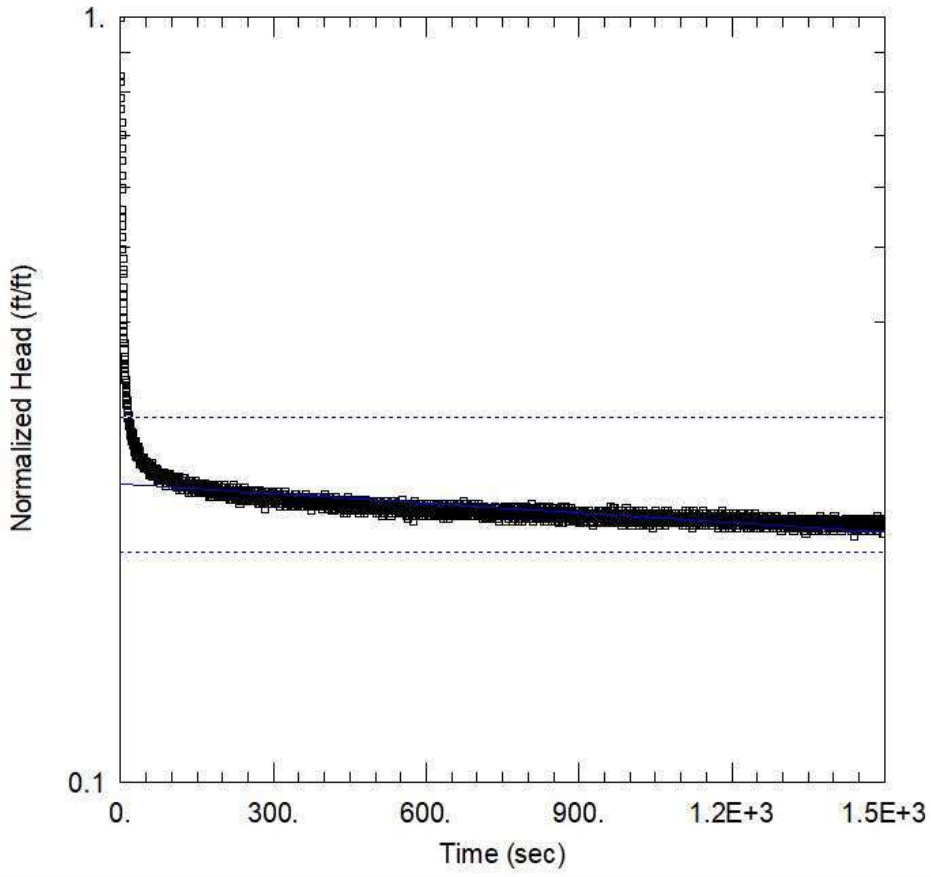
WELL DATA (W-5)

Initial Displacement: 1.314 ft
Total Well Penetration Depth: 7.07 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 7.07 ft
Screen Length: 7.07 ft
Well Radius: 0.3333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 2.069E-6 cm/sec y0 = 0.329 ft



W-5 RISING HEAD (SLUG OUT) 2

Data Set:
Date: 10/29/20 Time: 09:43:10

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-5
Test Date: 10/14/2020

AQUIFER DATA

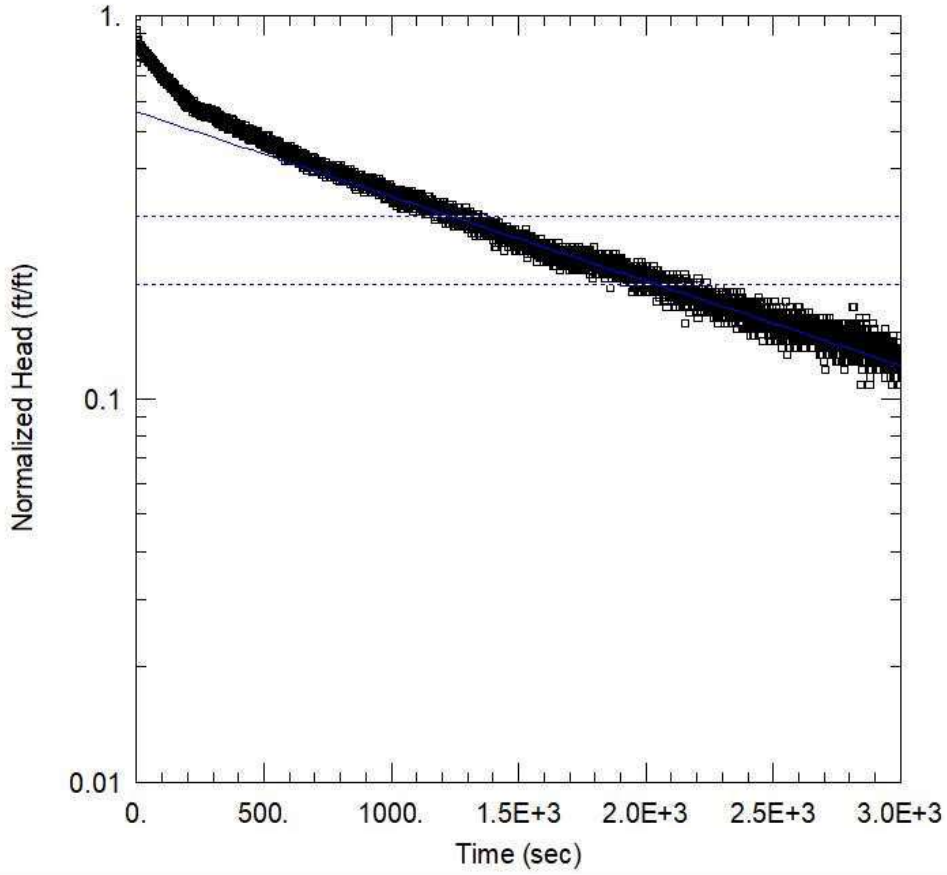
Saturated Thickness: 7.07 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-5)

Initial Displacement: 1.388 ft
Total Well Penetration Depth: 7.07 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 7.07 ft
Screen Length: 7.07 ft
Well Radius: 0.3333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 3.31E-6 cm/sec
y0 = 0.3404 ft



W-6 FALLING HEAD (SLUG IN)

Data Set:
Date: 10/28/20 Time: 17:40:23

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-6
Test Date: 10/14/2020

AQUIFER DATA

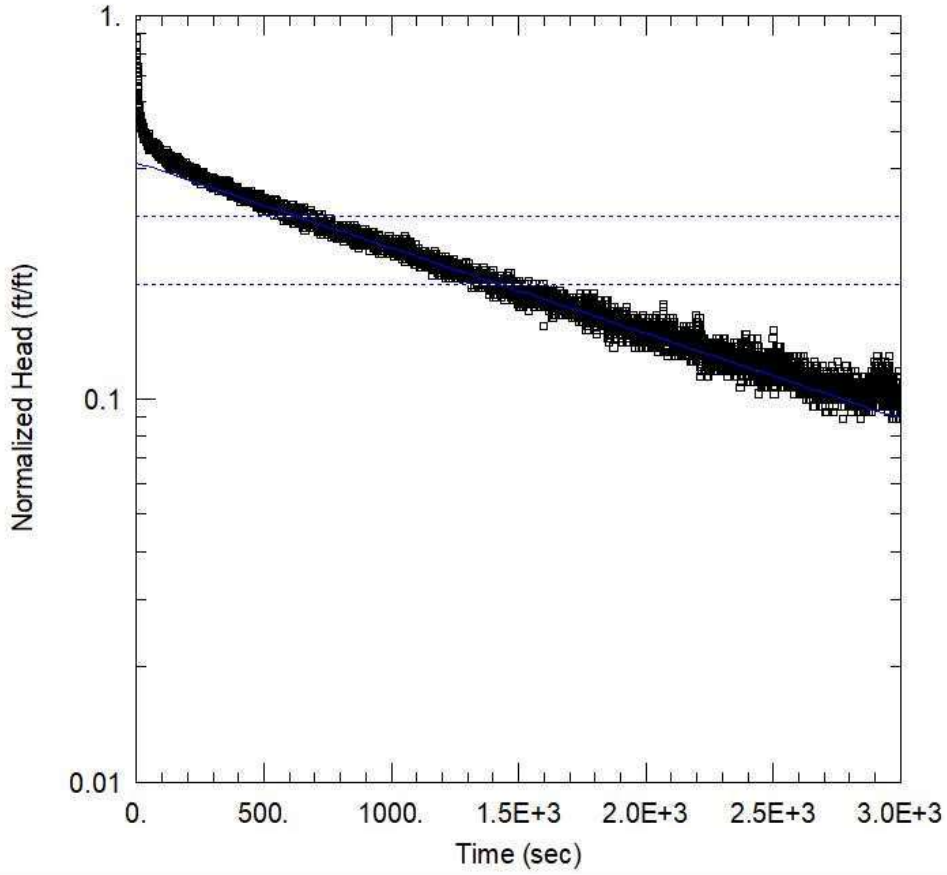
Saturated Thickness: 9.18 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-6)

Initial Displacement: 0.4227 ft
Total Well Penetration Depth: 9.18 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 9.18 ft
Screen Length: 9.18 ft
Well Radius: 0.3333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 8.045E-5 cm/sec
y0 = 0.2376 ft



W-6 RISING HEAD (SLUG OUT)

Data Set:
Date: 10/28/20 Time: 17:43:25

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-6
Test Date: 10/14/2020

AQUIFER DATA

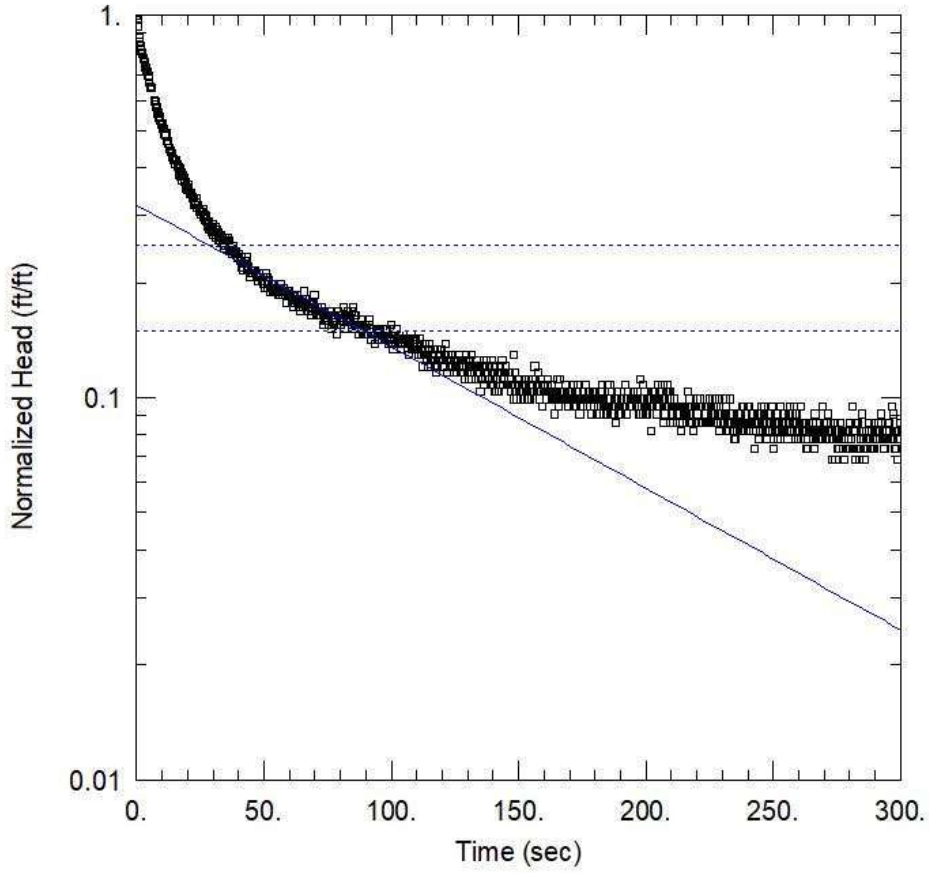
Saturated Thickness: 9.18 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-6)

Initial Displacement: 0.6226 ft
Total Well Penetration Depth: 9.18 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 9.18 ft
Screen Length: 9.18 ft
Well Radius: 0.3333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 8.117E-5 cm/sec
y0 = 0.2578 ft



W-7 FALLING HEAD (SLUG IN)

Data Set:
Date: 10/28/20 Time: 16:47:21

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-7
Test Date: 10/14/2020

AQUIFER DATA

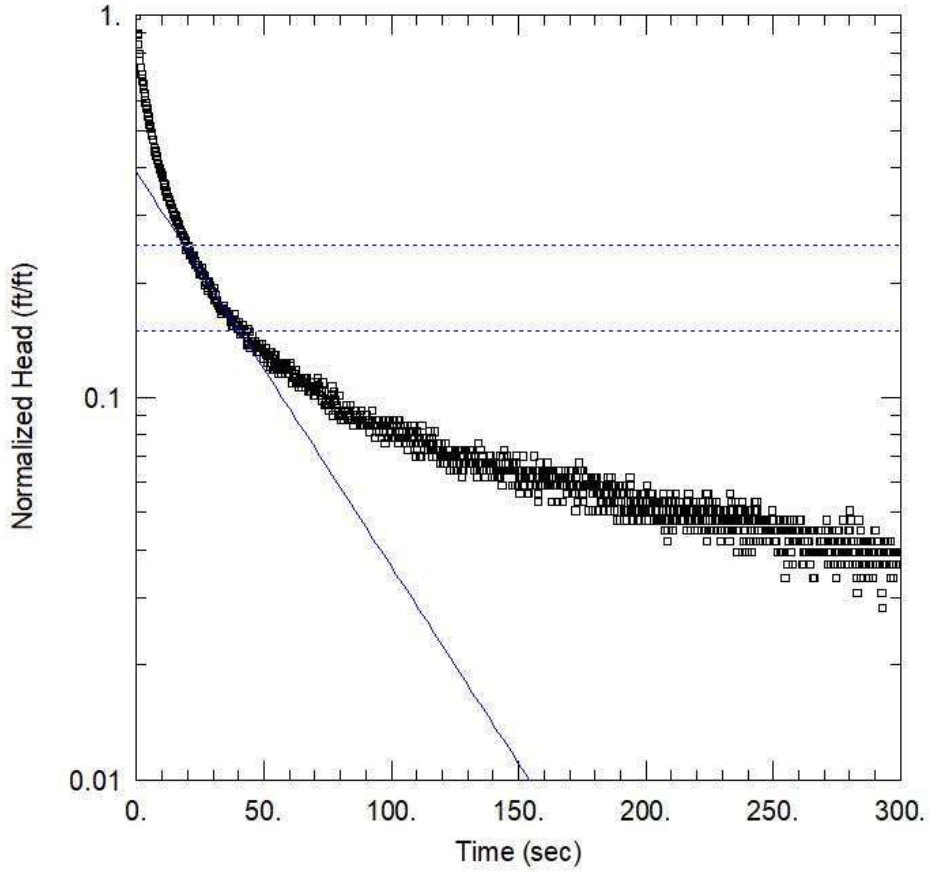
Saturated Thickness: 16.53 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-7)

Initial Displacement: 0.5228 ft
Total Well Penetration Depth: 16.53 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 16.53 ft
Screen Length: 15. ft
Well Radius: 0.2083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.0002992 cm/sec
y0 = 0.1667 ft



W-7 RISING HEAD (SLUG OUT)

Data Set:
Date: 10/28/20 Time: 16:58:22

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-7
Test Date: 10/14/2020

AQUIFER DATA

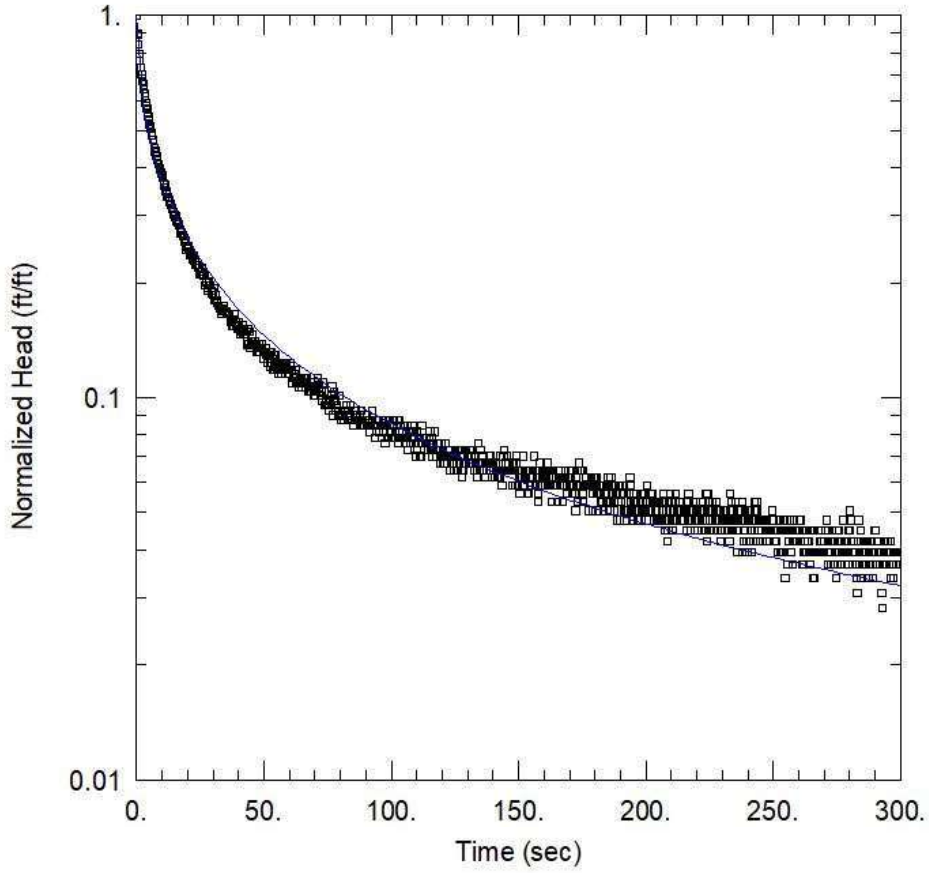
Saturated Thickness: 16.53 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-7)

Initial Displacement: 0.8023 ft
Total Well Penetration Depth: 16.53 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 16.53 ft
Screen Length: 15. ft
Well Radius: 0.2083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.0008327 cm/sec
y0 = 0.3119 ft



W-7 RISING HEAD (SLUG OUT)

Data Set:
Date: 10/28/20 Time: 17:09:35

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-7
Test Date: 10/14/2020

AQUIFER DATA

Saturated Thickness: 16.53 ft

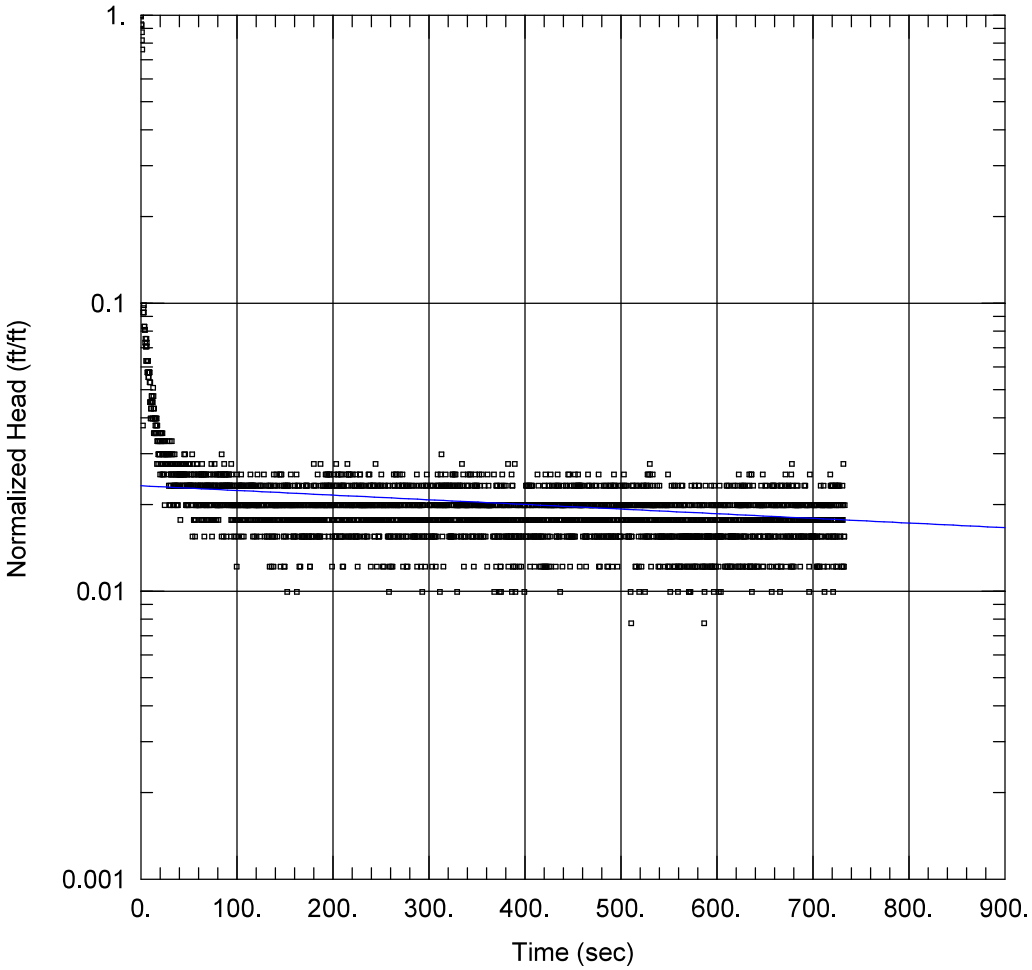
WELL DATA (W-7)

Initial Displacement: 0.8023 ft
Total Well Penetration Depth: 16.53 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 16.53 ft
Screen Length: 15. ft
Well Radius: 0.2083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0003313 cm/sec
Kz/Kr = 1.
Ss = 0.01114 ft^{-1}



MW-1B (FH1)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-1B
Test Date: 10/13/2020

AQUIFER DATA

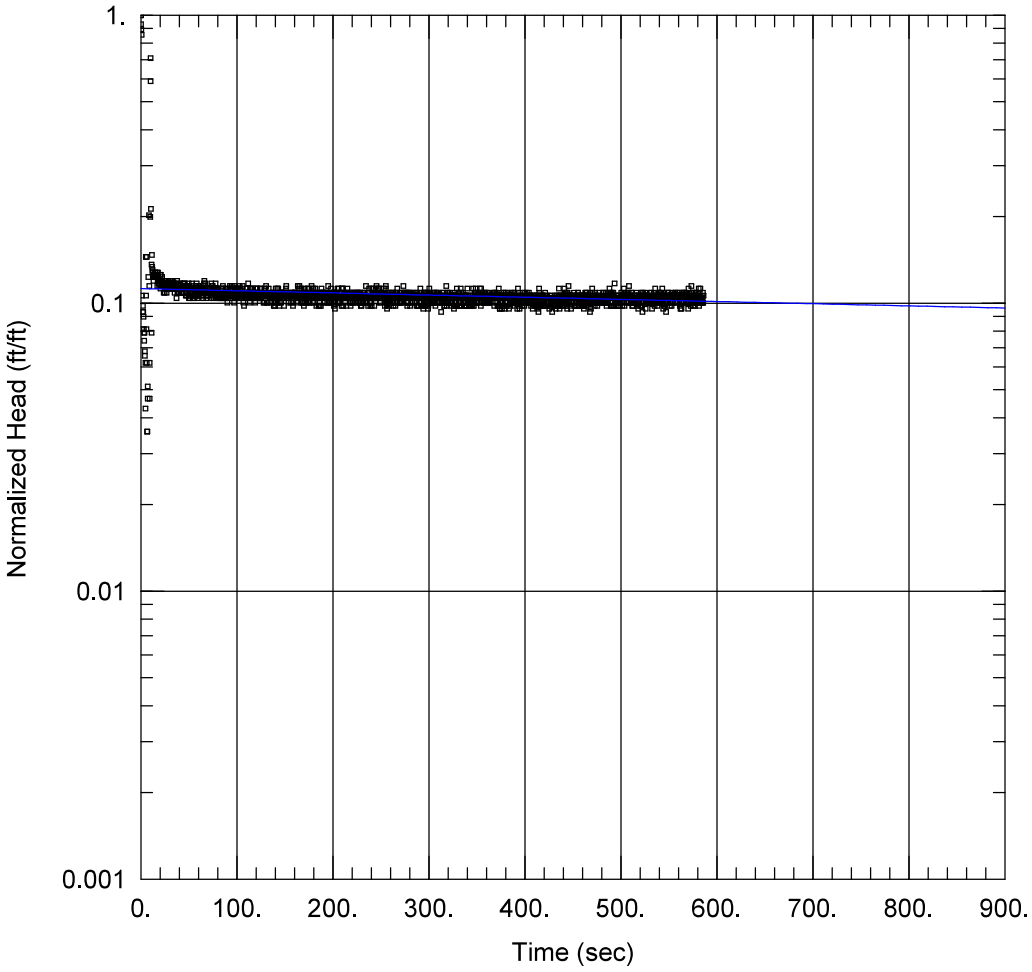
Saturated Thickness: 10.98 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1B)

Initial Displacement: 0.905 ft
Total Well Penetration Depth: 10.98 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.98 ft
Screen Length: 10.98 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.8E-5 cm/sec
y0 = 0.021 ft



MW-1B (FH2)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-1B
Test Date: 10/13/2020

AQUIFER DATA

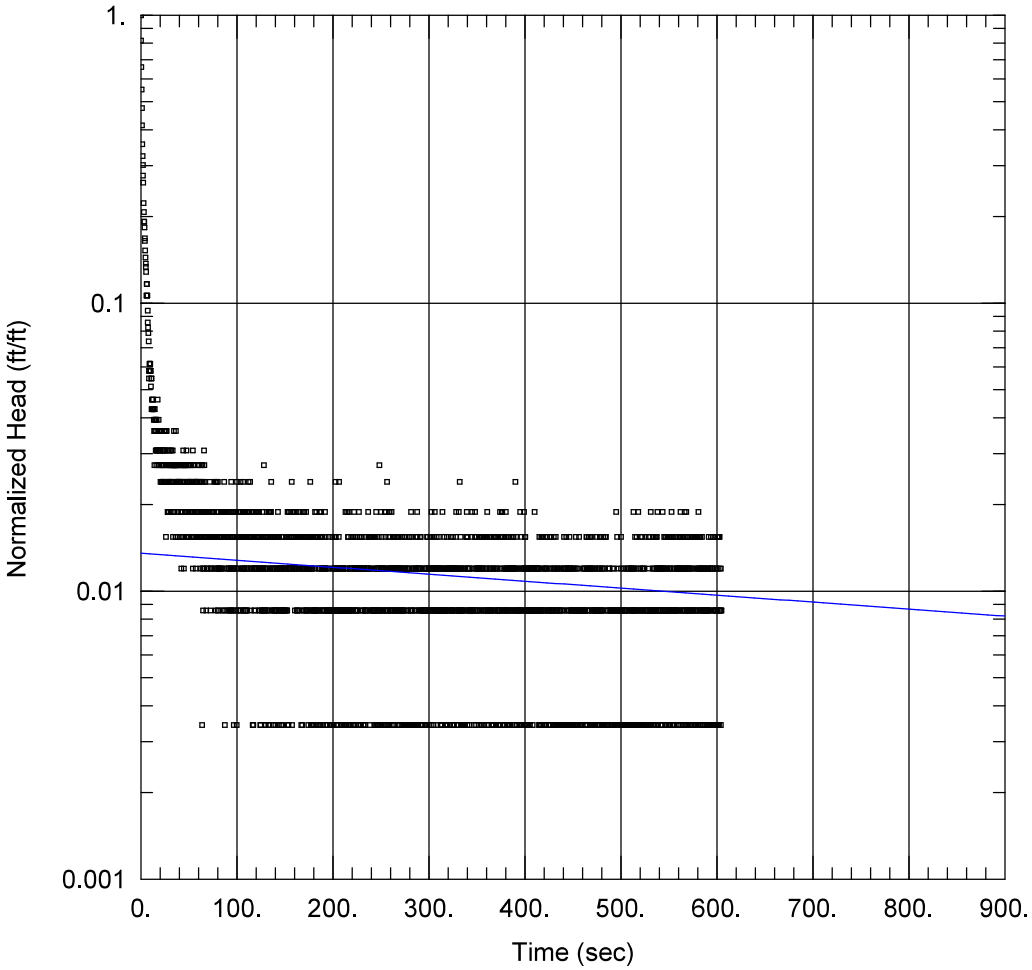
Saturated Thickness: 10.98 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1B)

Initial Displacement: 0.837 ft
Total Well Penetration Depth: 10.98 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.98 ft
Screen Length: 10.98 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.3E-5 cm/sec
y0 = 0.094 ft



MW-1B (RH1)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-1B
Test Date: 10/13/2020

AQUIFER DATA

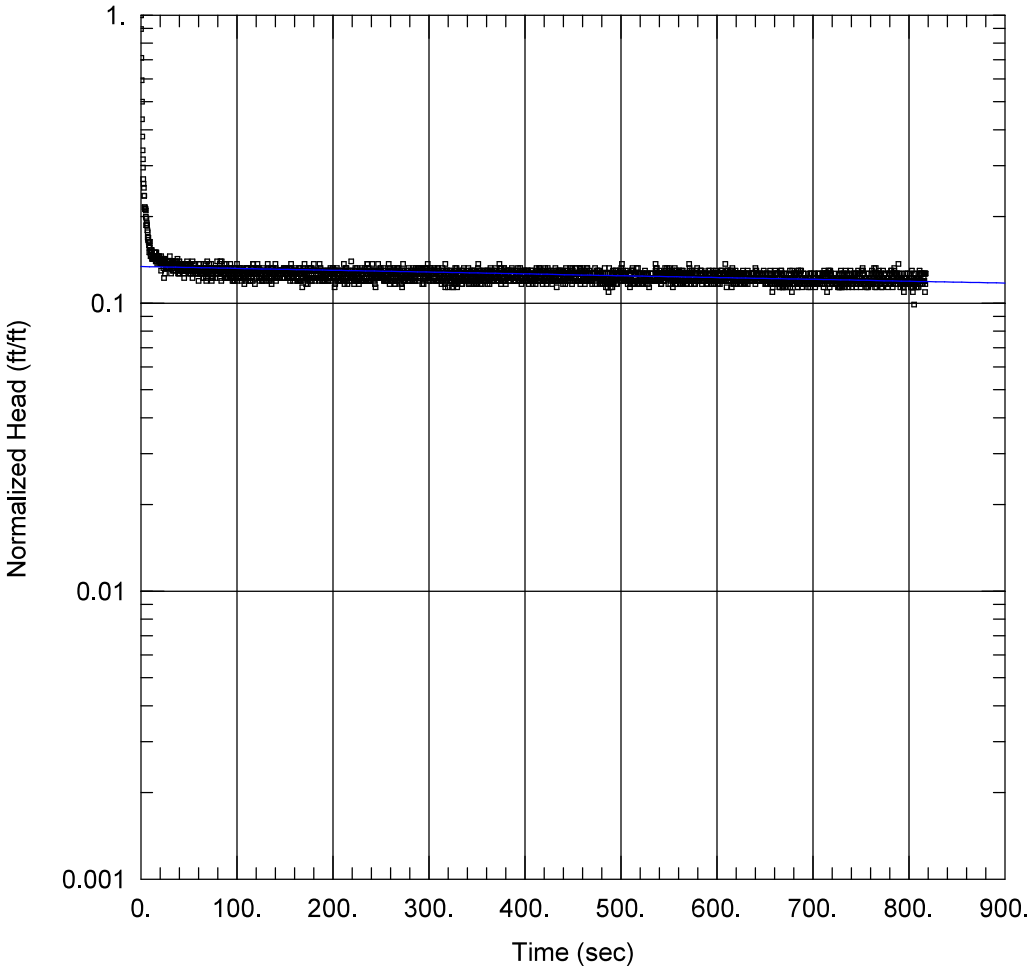
Saturated Thickness: 10.98 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1B)

Initial Displacement: 0.584 ft
Total Well Penetration Depth: 10.98 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.98 ft
Screen Length: 10.98 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.2E-5 cm/sec
y0 = 0.0079 ft



MW-1B (RH2)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-1B
Test Date: 10/13/2020

AQUIFER DATA

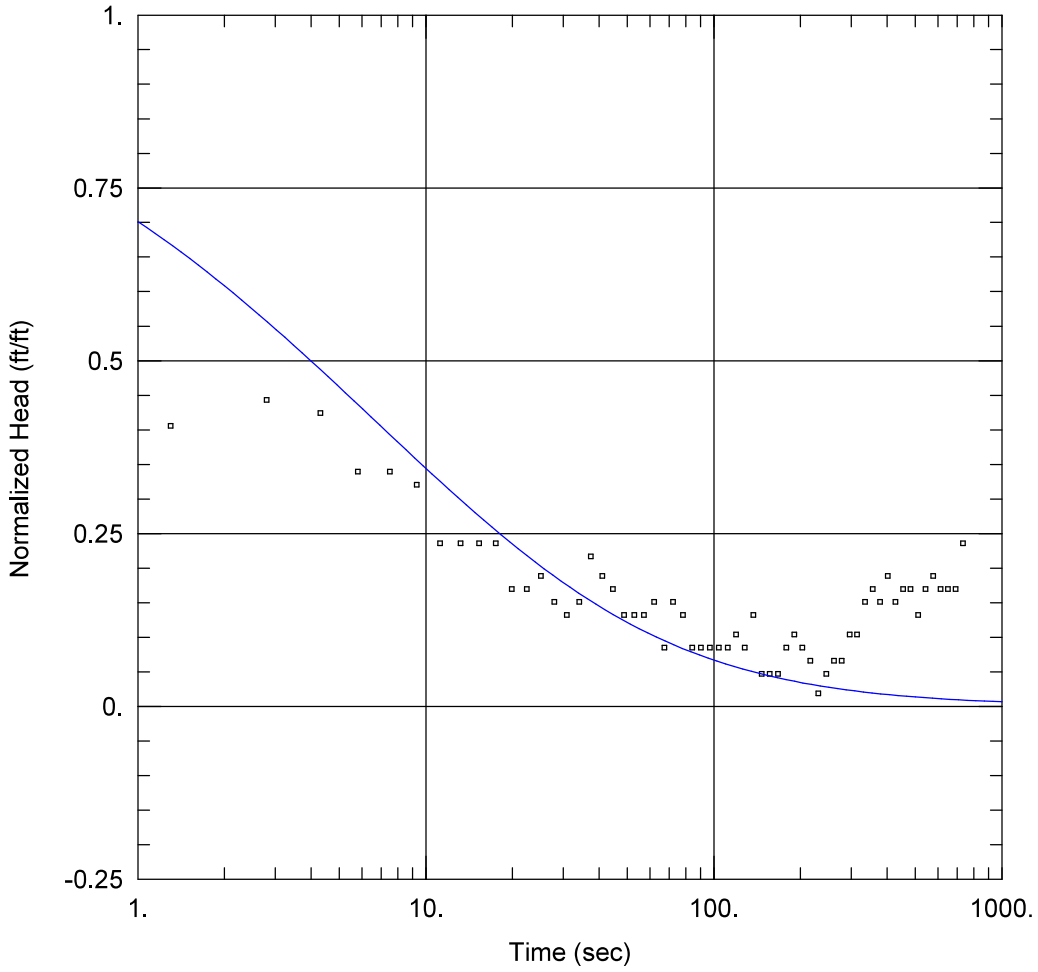
Saturated Thickness: 10.98 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-1B)

Initial Displacement: 0.687 ft
Total Well Penetration Depth: 10.98 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.98 ft
Screen Length: 10.98 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.1E-5 cm/sec
y0 = 0.092 ft



MW-2B (FH1)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-2B
Test Date: 10/12/2020

AQUIFER DATA

Saturated Thickness: 15. ft

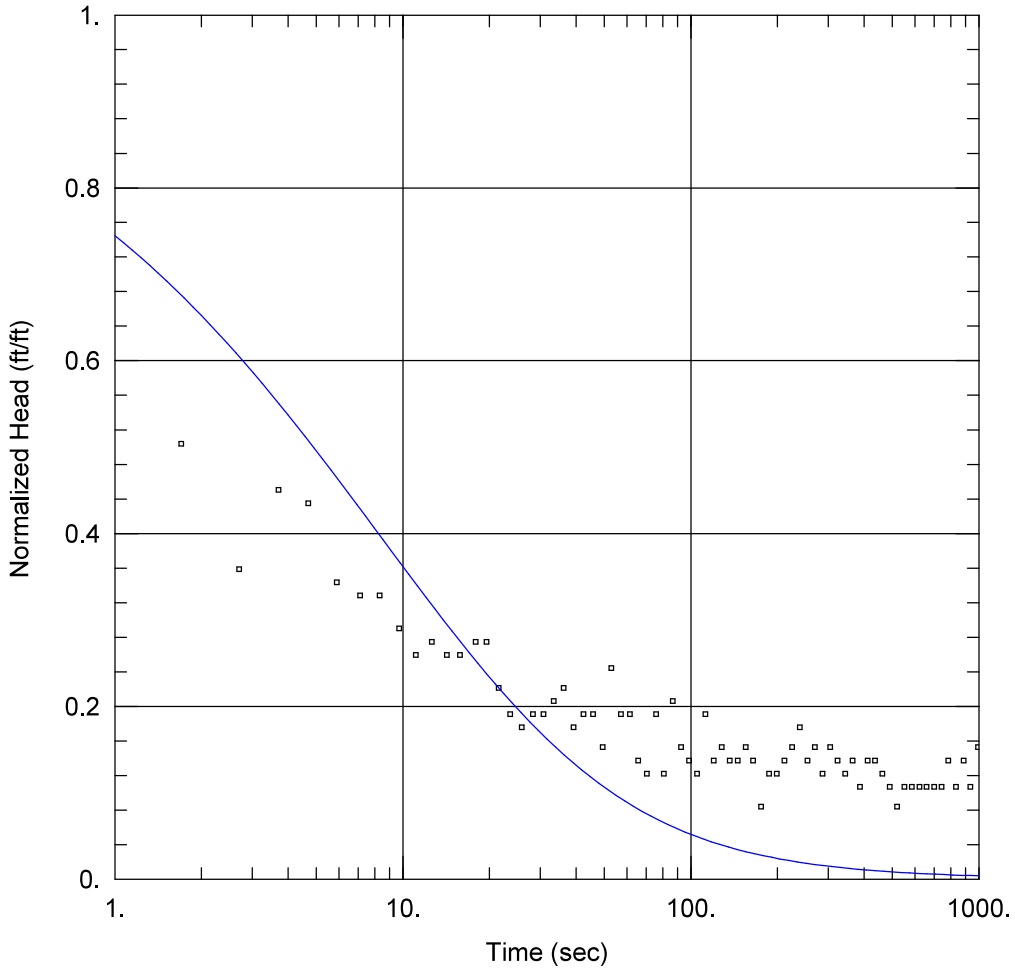
WELL DATA (MW-2B)

Initial Displacement: 0.106 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.0833 ft
Static Water Column Height: 14.09 ft
Screen Length: 10. ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.00071 cm/sec
Kz/Kr = 1.
Ss = 0.0047 ft^{-1}



MW-2B (FH2)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-2B
Test Date: 10/12/2020

AQUIFER DATA

Saturated Thickness: 15. ft

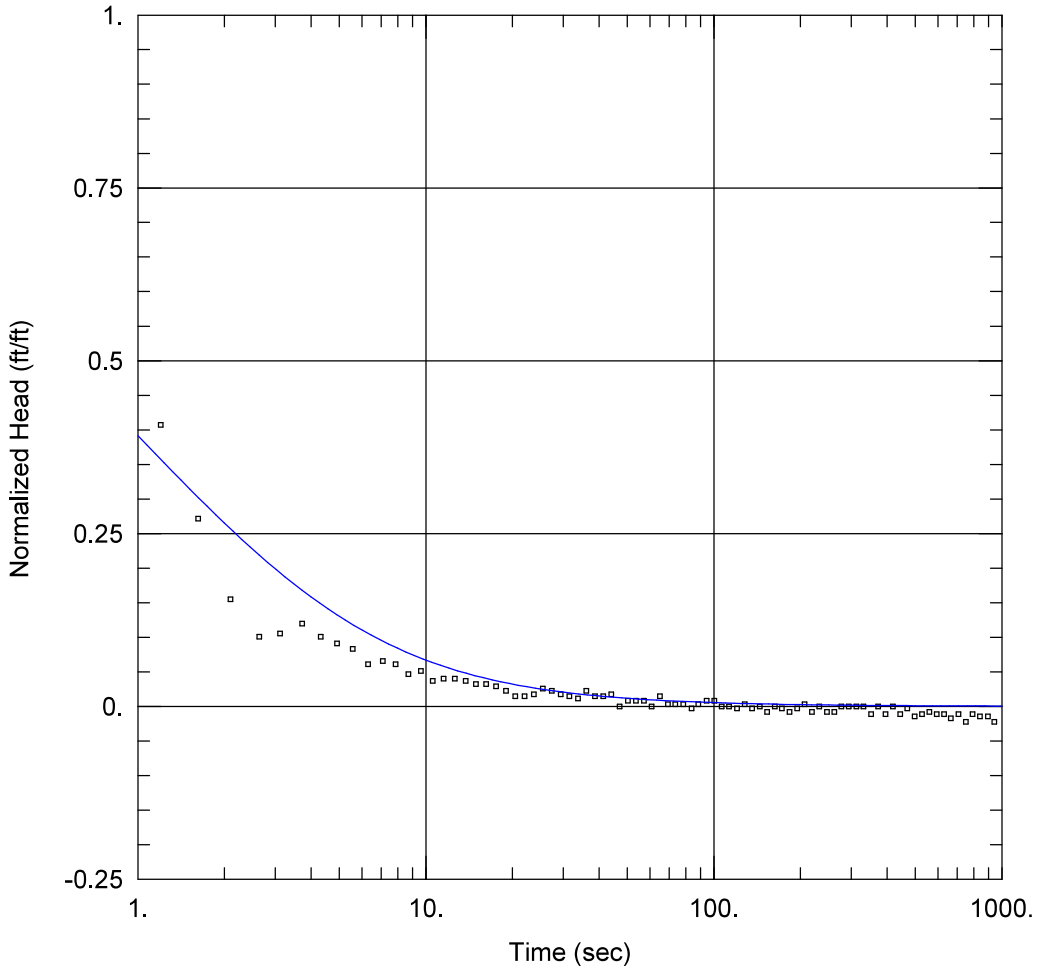
WELL DATA (MW-2B)

Initial Displacement: 0.131 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.0833 ft
Static Water Column Height: 14.09 ft
Screen Length: 10. ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.0011 cm/sec
Kz/Kr = 1.
Ss = 0.0017 ft^{-1}



MW-2B (RH1)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-2B
Test Date: 10/12/2020

AQUIFER DATA

Saturated Thickness: 15. ft

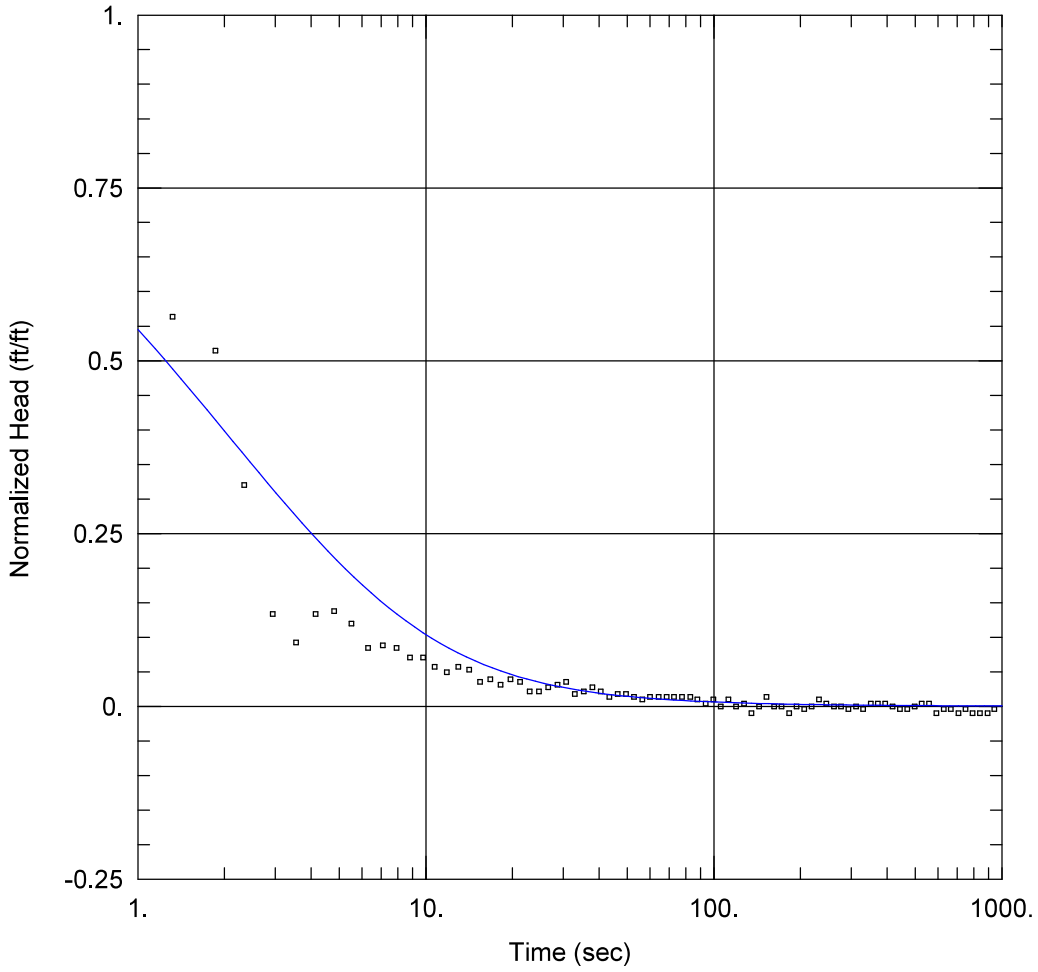
WELL DATA (MW-2B)

Initial Displacement: 0.626 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.0833 ft
Static Water Column Height: 14.09 ft
Screen Length: 10. ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.0083 cm/sec
Kz/Kr = 1.
Ss = 0.0022 ft^{-1}



MW-2B (RH2)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-2B
Test Date: 10/12/2020

AQUIFER DATA

Saturated Thickness: 15. ft

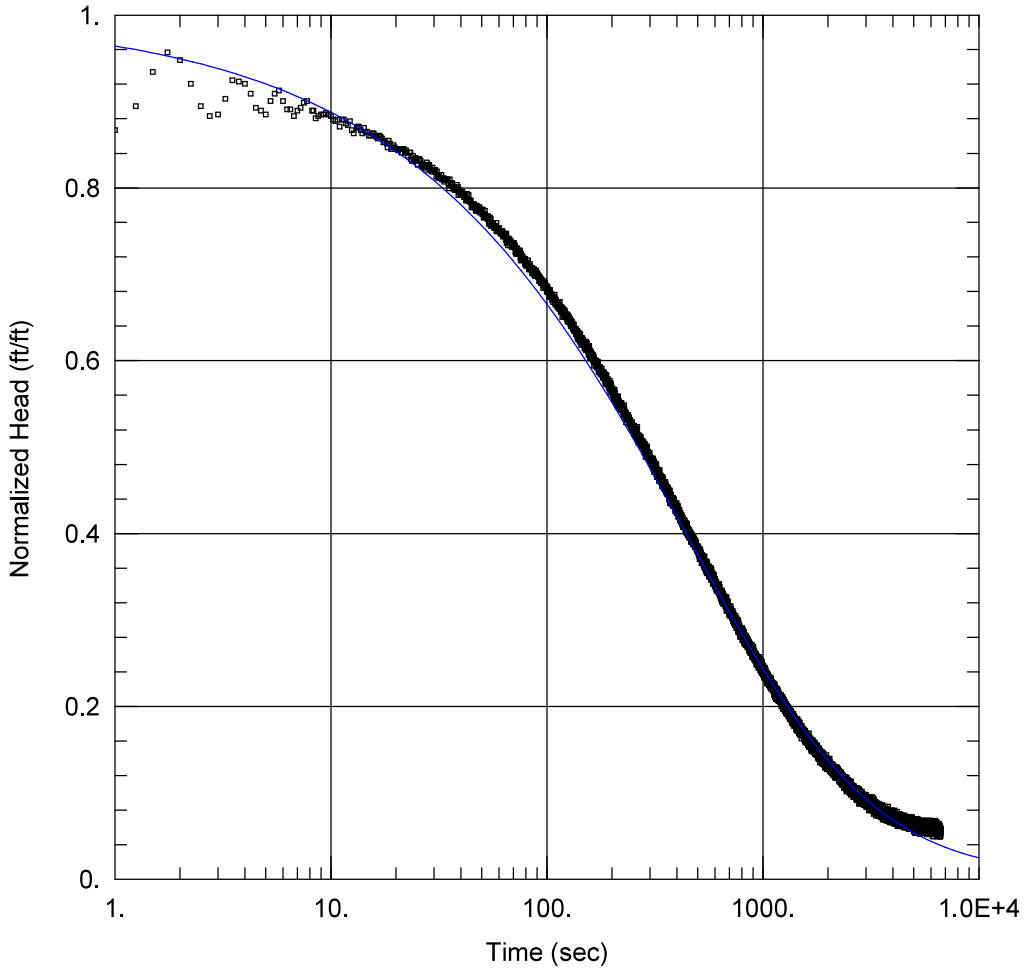
WELL DATA (MW-2B)

Initial Displacement: 0.509 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.0833 ft
Static Water Column Height: 14.09 ft
Screen Length: 10. ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.0067 cm/sec
Kz/Kr = 1.
Ss = 0.00068 ft^{-1}



MW-4B (FH1)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-4B
Test Date: 10/13/2020

AQUIFER DATA

Saturated Thickness: 19.58 ft

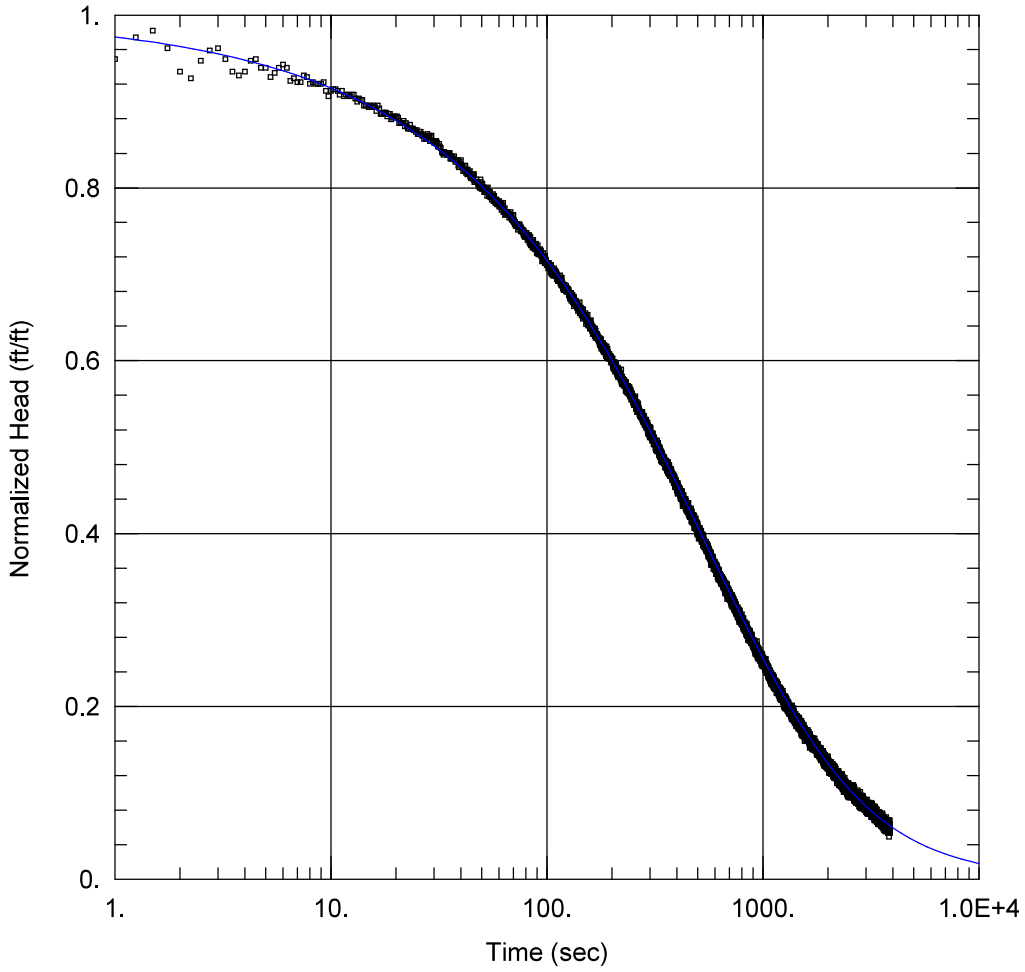
WELL DATA (MW-4B)

Initial Displacement: 1.156 ft
Total Well Penetration Depth: 19.58 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 19.58 ft
Screen Length: 19.58 ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.1E-5 cm/sec
Kz/Kr = 1.
Ss = 0.00078 ft^{-1}



MW-4B (RH1)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: MW-4B
Test Date: 10/13/2020

AQUIFER DATA

Saturated Thickness: 19.58 ft

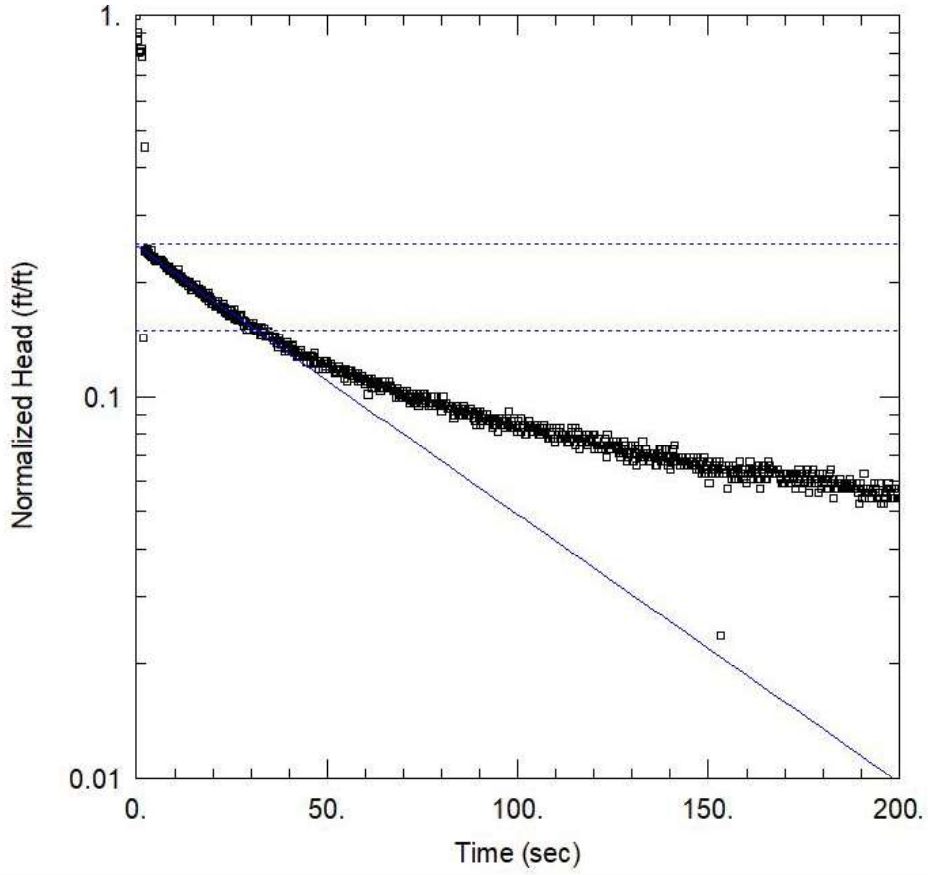
WELL DATA (MW-4B)

Initial Displacement: 1.119 ft
Total Well Penetration Depth: 19.58 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 19.58 ft
Screen Length: 19.58 ft
Well Radius: 0.333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.4E-5 cm/sec
Kz/Kr = 1.
Ss = 0.00029 ft^{-1}



MW-6 FALLING HEAD (SLUG IN)

Data Set:
Date: 10/29/20 Time: 11:21:39

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-6
Test Date: 10/13/2020

AQUIFER DATA

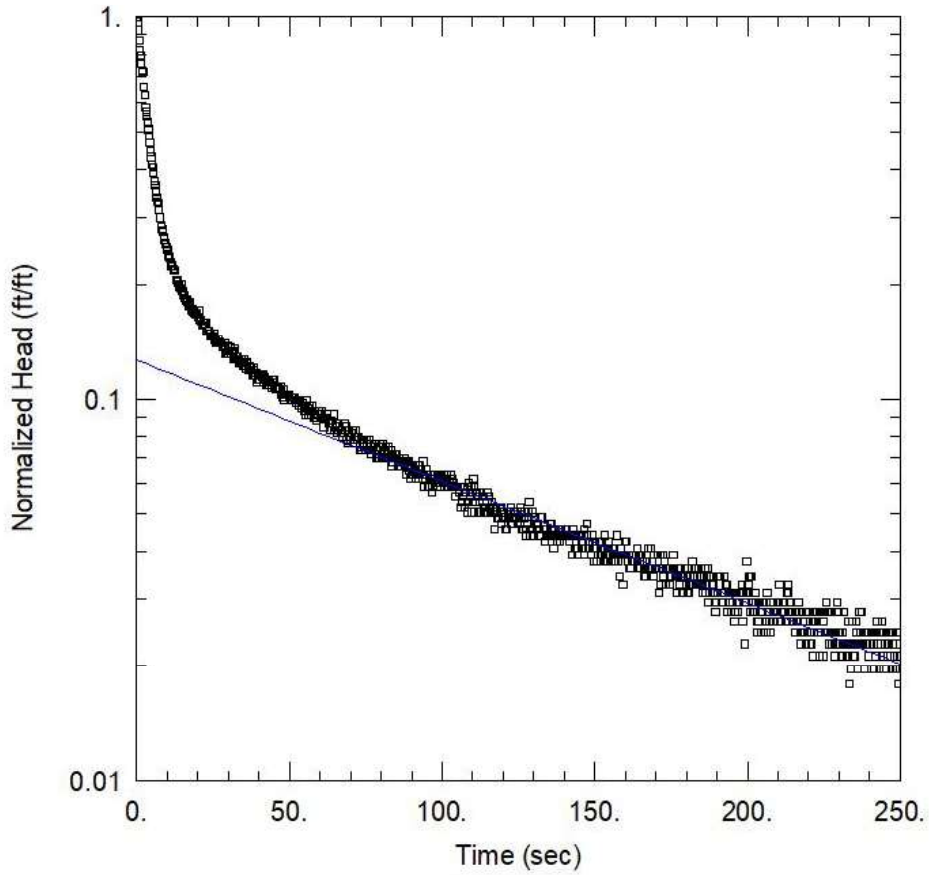
Saturated Thickness: 26.28 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-6)

Initial Displacement: 1.356 ft
Total Well Penetration Depth: 26.28 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 26.28 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.0007013 cm/sec
y0 = 0.3364 ft



MW-6 RISING HEAD (SLUG OUT)

Data Set:
Date: 10/29/20 Time: 11:32:04

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: MW-6
Test Date: 10/13/2020

AQUIFER DATA

Saturated Thickness: 26.28 ft Anisotropy Ratio (Kz/Kr): 1.

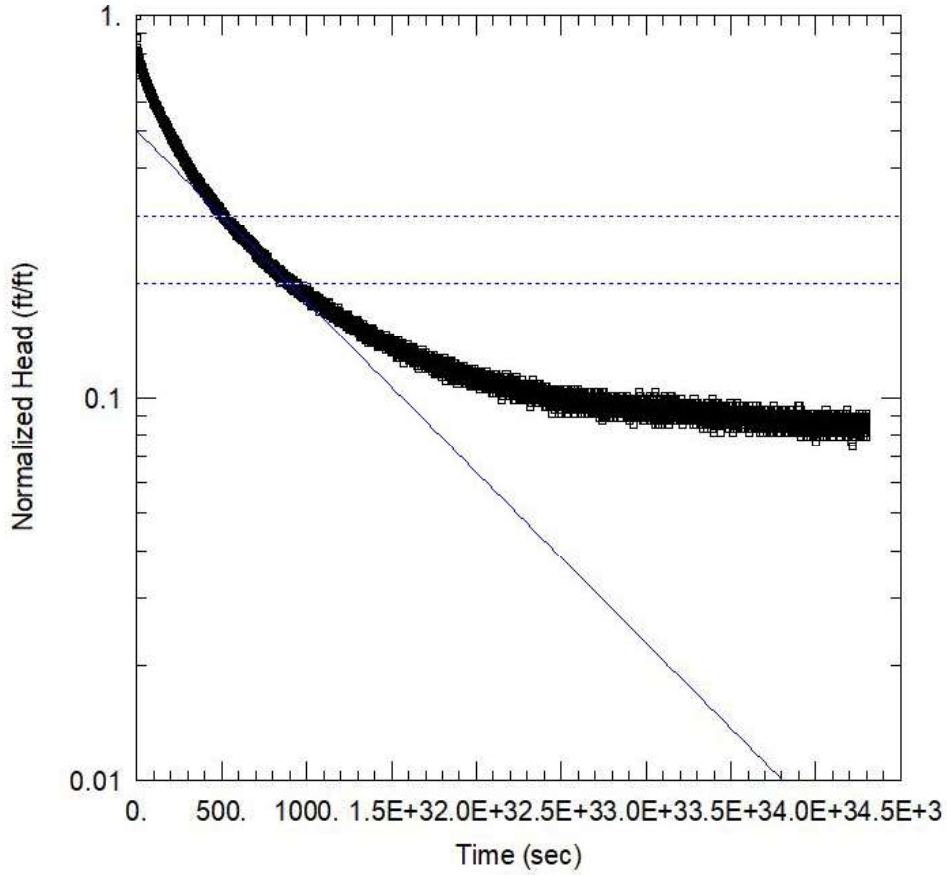
WELL DATA (MW-6)

Initial Displacement: 1.409 ft
Total Well Penetration Depth: 26.28 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 26.28 ft
Screen Length: 10. ft
Well Radius: 0.3333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Hvorslev

K = 0.00175 cm/sec y0 = 0.1785 ft



W-2A FALLING HEAD (SLUG IN)

Data Set:
Date: 10/29/20 Time: 09:56:24

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-2A
Test Date: 10/15/2020

AQUIFER DATA

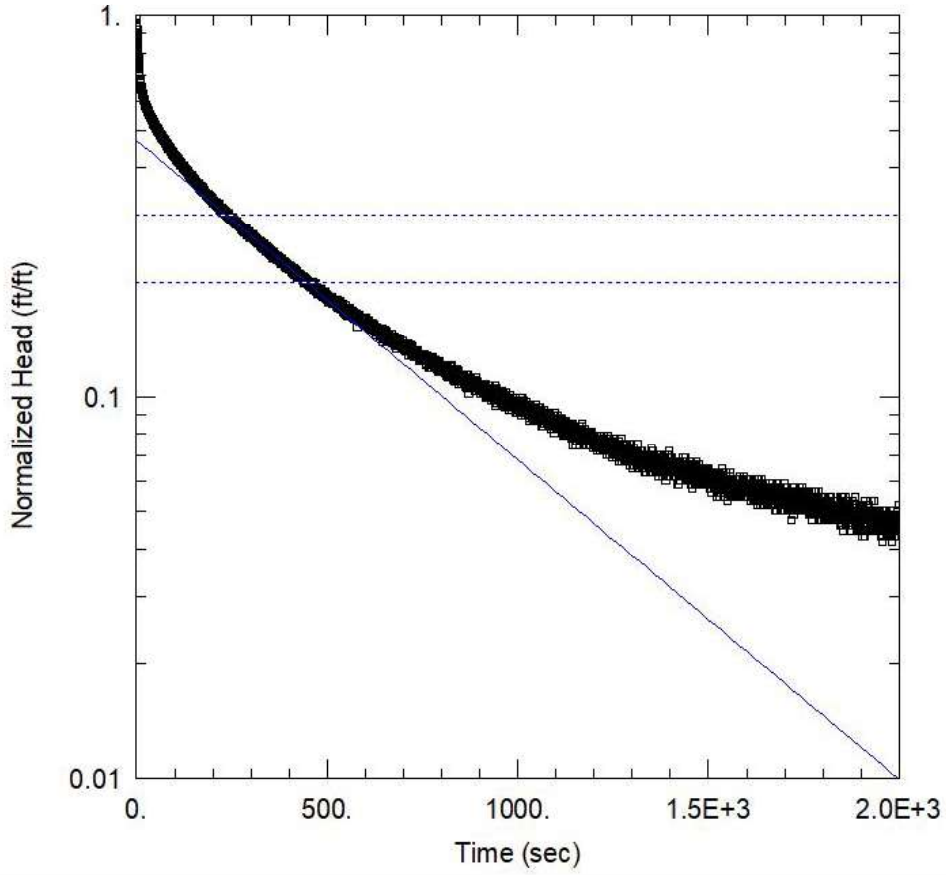
Saturated Thickness: 8.06 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-2A)

Initial Displacement: 1.113 ft
Total Well Penetration Depth: 8.06 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.06 ft
Screen Length: 8.06 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 9.678E-5 cm/sec y0 = 0.5565 ft



W-2A RISING HEAD (SLUG OUT)

Data Set:
Date: 10/29/20 Time: 10:25:11

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-2A
Test Date: 10/15/2020

AQUIFER DATA

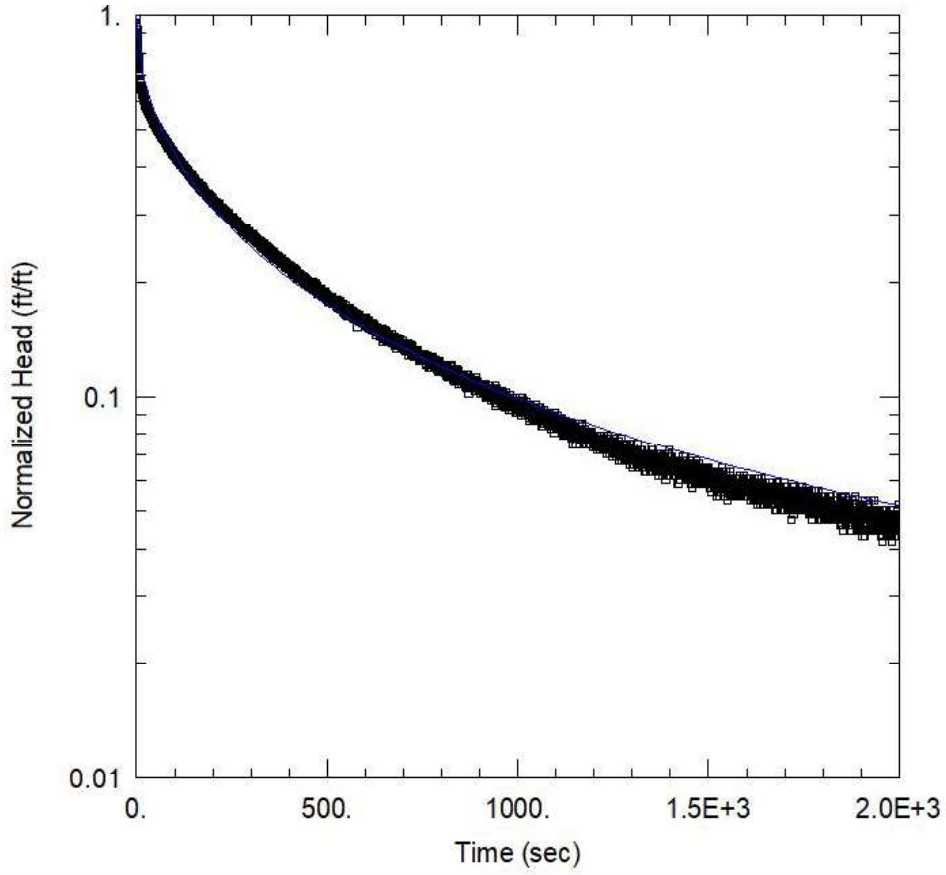
Saturated Thickness: 8.06 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-2A)

Initial Displacement: 1.561 ft
Total Well Penetration Depth: 8.06 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.06 ft
Screen Length: 8.06 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001816 cm/sec
y0 = 0.7356 ft



W-2A RISING HEAD (SLUG OUT)

Data Set:
Date: 10/29/20 Time: 12:51:52

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-2A
Test Date: 10/15/2020

AQUIFER DATA

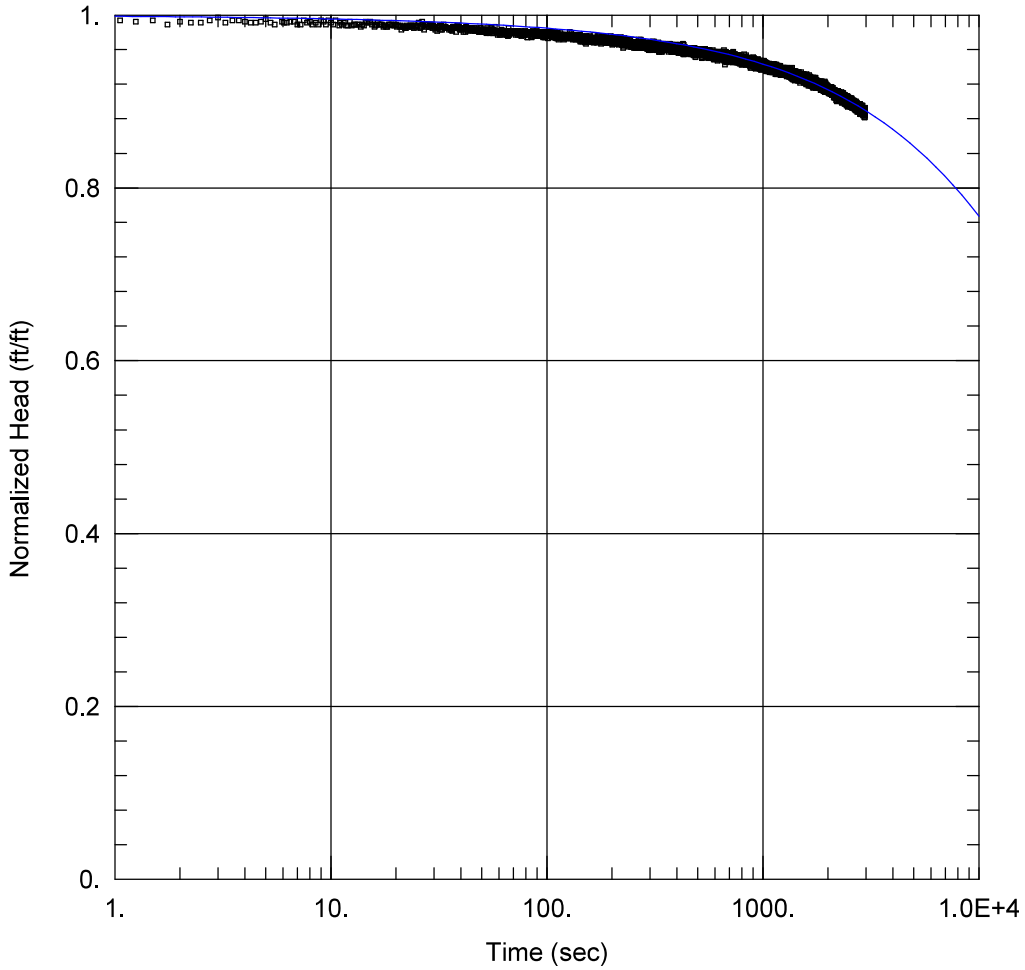
Saturated Thickness: 8.06 ft

WELL DATA (W-2A)

Initial Displacement: 1.561 ft
Total Well Penetration Depth: 8.06 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 8.06 ft
Screen Length: 8.06 ft
Well Radius: 0.2083 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model
Kr = 5.86E-5 cm/sec
Kz/Kr = 1.
Ss = 0.01241 ft^{-1}



W-2B (RH3)

PROJECT INFORMATION

Company: HDR
Location: Xcel_Comanche_CCR
Test Well: W-2B
Test Date: 10/15/2020

AQUIFER DATA

Saturated Thickness: 23.64 ft

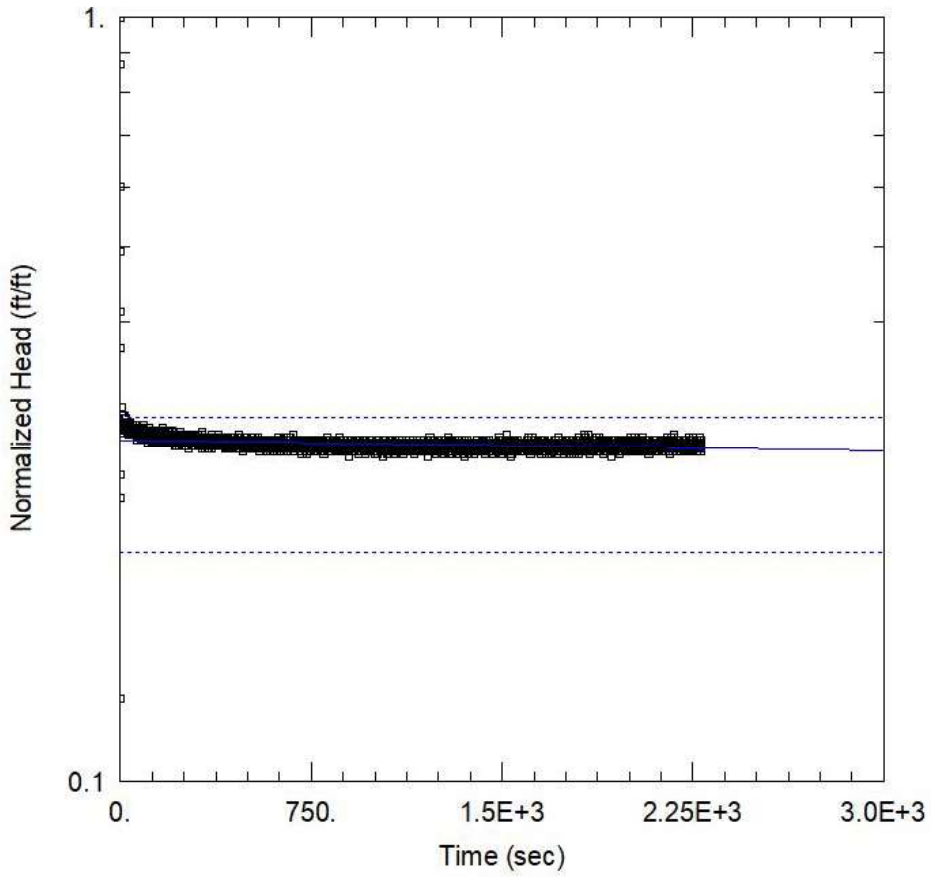
WELL DATA (W-2B)

Initial Displacement: 1.481 ft
Total Well Penetration Depth: 23.64 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 23.64 ft
Screen Length: 20. ft
Well Radius: 0.333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.9E-7 cm/sec
Kz/Kr = 1.
Ss = 6.3E-5 ft^{-1}



W-5 FALLING HEAD (SLUG IN) 1

Data Set:
Date: 10/29/20 Time: 08:40:07

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-5
Test Date: 10/14/2020

AQUIFER DATA

Saturated Thickness: 7.07 ft Anisotropy Ratio (Kz/Kr): 1.

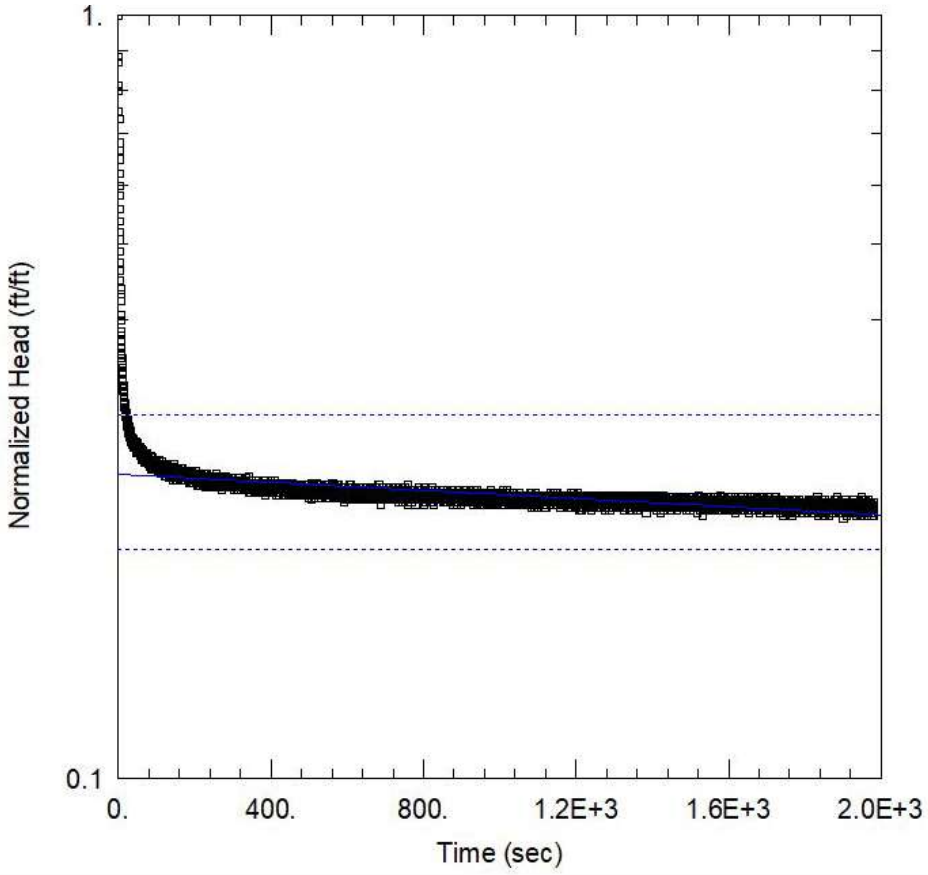
WELL DATA (W-5)

Initial Displacement: 1.111 ft
Total Well Penetration Depth: 7.07 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 7.07 ft
Screen Length: 7.07 ft
Well Radius: 0.3333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 2.127E-6 cm/sec y0 = 0.3111 ft



W-5 RISING HEAD (SLUG OUT) 1

Data Set:
Date: 10/29/20 Time: 09:36:04

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-5
Test Date: 10/14/2020

AQUIFER DATA

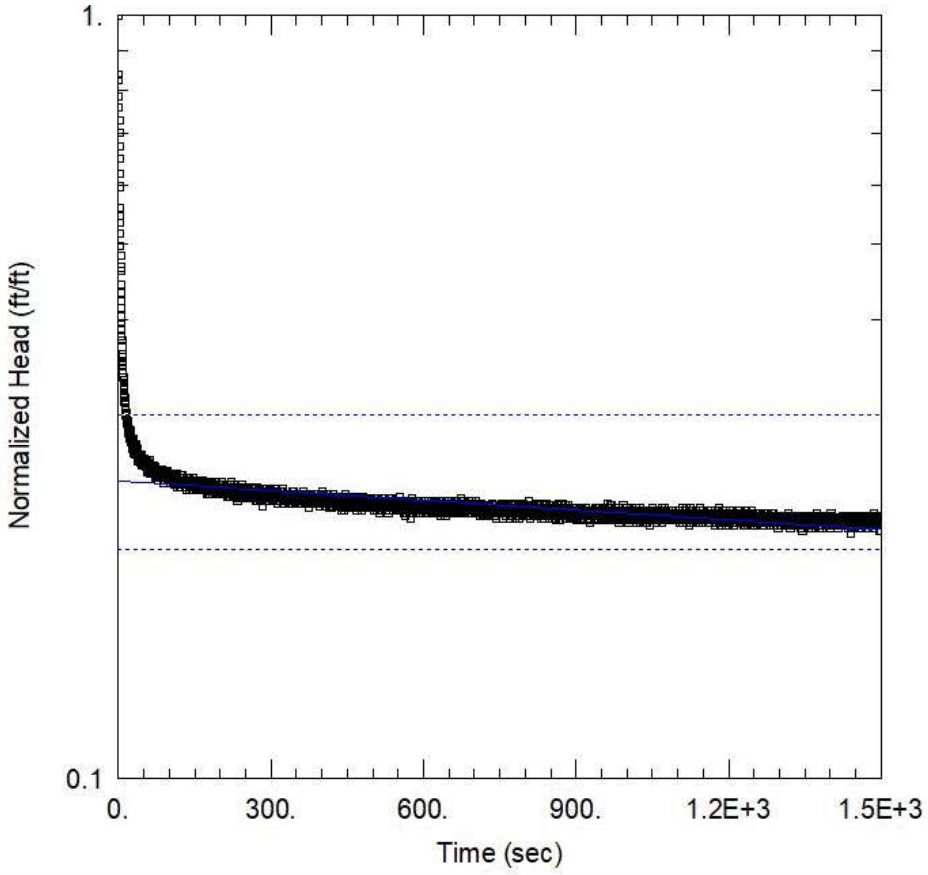
Saturated Thickness: 7.07 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-5)

Initial Displacement: 1.314 ft
Total Well Penetration Depth: 7.07 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 7.07 ft
Screen Length: 7.07 ft
Well Radius: 0.3333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice
K = 2.069E-6 cm/sec y0 = 0.329 ft



W-5 RISING HEAD (SLUG OUT) 2

Data Set:
Date: 10/29/20 Time: 09:43:10

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-5
Test Date: 10/14/2020

AQUIFER DATA

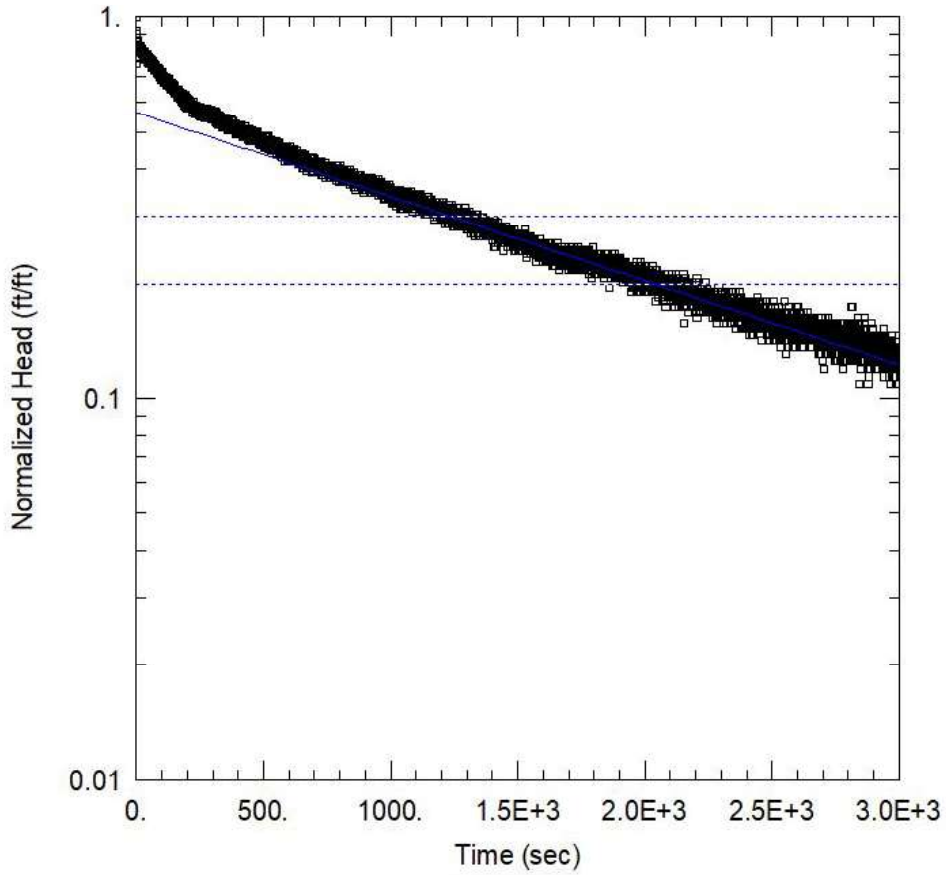
Saturated Thickness: 7.07 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-5)

Initial Displacement: 1.388 ft
Total Well Penetration Depth: 7.07 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 7.07 ft
Screen Length: 7.07 ft
Well Radius: 0.3333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 3.31E-6 cm/sec
y0 = 0.3404 ft



W-6 FALLING HEAD (SLUG IN)

Data Set:
Date: 10/28/20 Time: 17:40:23

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-6
Test Date: 10/14/2020

AQUIFER DATA

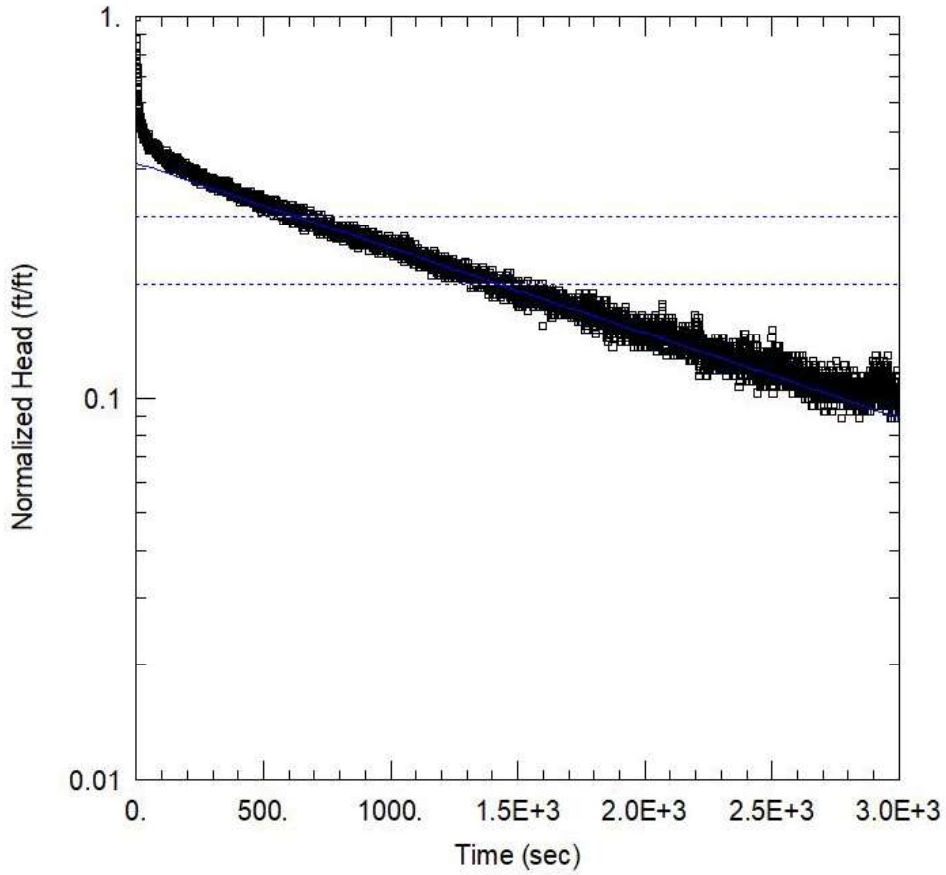
Saturated Thickness: 9.18 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-6)

Initial Displacement: 0.4227 ft
Total Well Penetration Depth: 9.18 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 9.18 ft
Screen Length: 9.18 ft
Well Radius: 0.3333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 8.045E-5 cm/sec
y0 = 0.2376 ft



W-6 RISING HEAD (SLUG OUT)

Data Set:
Date: 10/28/20 Time: 17:43:25

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-6
Test Date: 10/14/2020

AQUIFER DATA

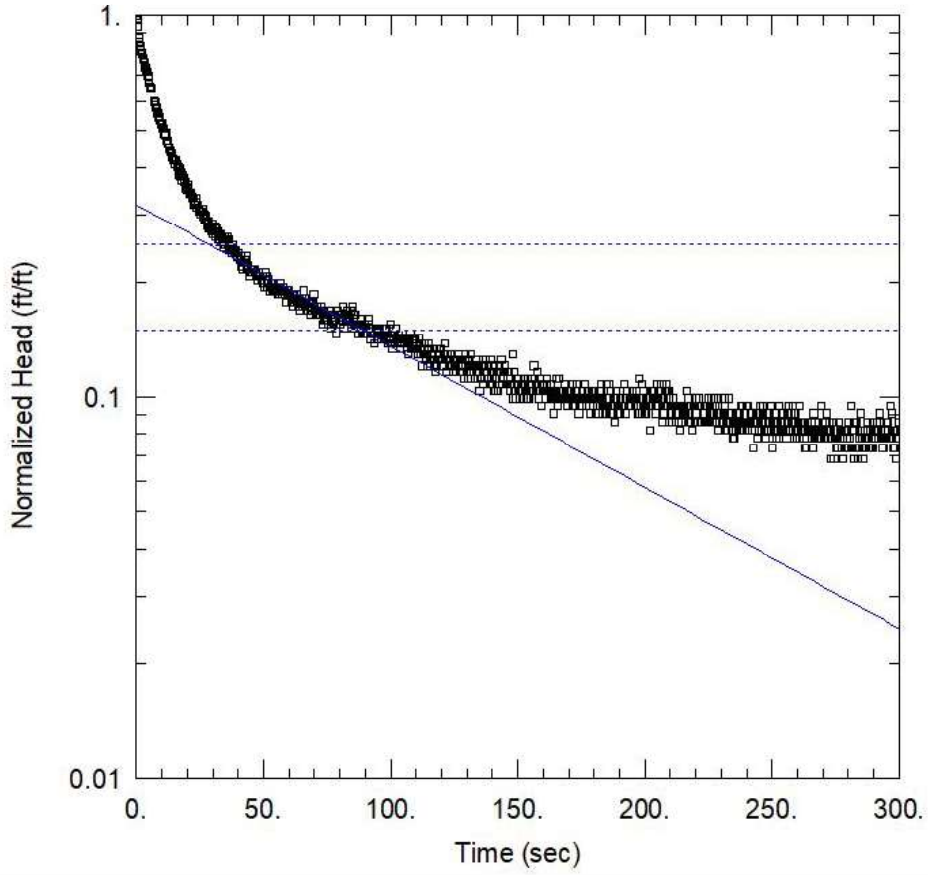
Saturated Thickness: 9.18 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-6)

Initial Displacement: 0.6226 ft
Total Well Penetration Depth: 9.18 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 9.18 ft
Screen Length: 9.18 ft
Well Radius: 0.3333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 8.117E-5 cm/sec
y0 = 0.2578 ft



W-7 FALLING HEAD (SLUG IN)

Data Set:
Date: 10/28/20 Time: 16:47:21

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-7
Test Date: 10/14/2020

AQUIFER DATA

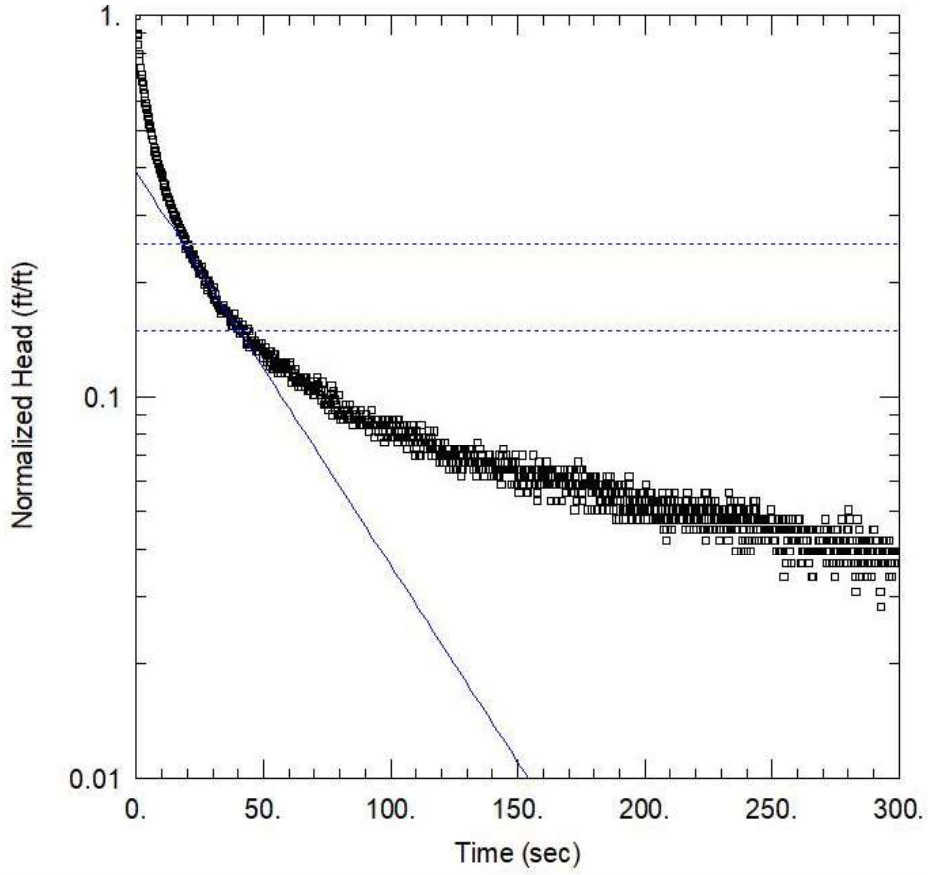
Saturated Thickness: 16.53 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-7)

Initial Displacement: 0.5228 ft
Total Well Penetration Depth: 16.53 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 16.53 ft
Screen Length: 15. ft
Well Radius: 0.2083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.0002992 cm/sec
y0 = 0.1667 ft



W-7 RISING HEAD (SLUG OUT)

Data Set:
Date: 10/28/20 Time: 16:58:22

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-7
Test Date: 10/14/2020

AQUIFER DATA

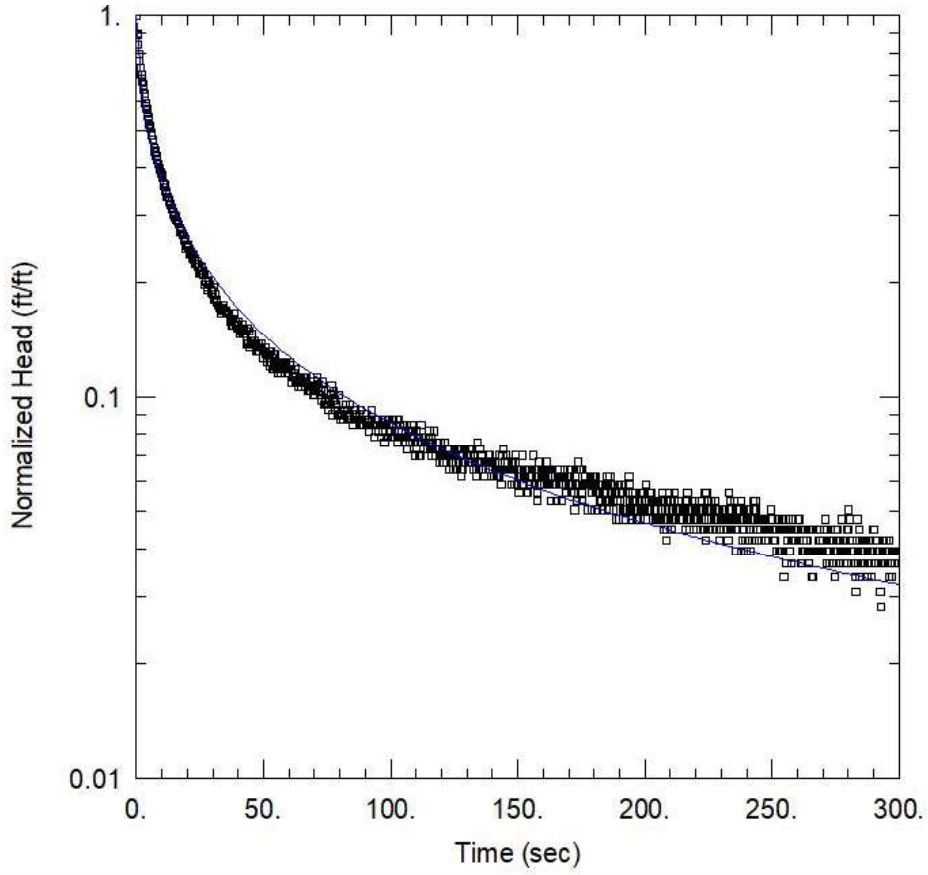
Saturated Thickness: 16.53 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (W-7)

Initial Displacement: 0.8023 ft
Total Well Penetration Depth: 16.53 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 16.53 ft
Screen Length: 15. ft
Well Radius: 0.2083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.0008327 cm/sec
y0 = 0.3119 ft



W-7 RISING HEAD (SLUG OUT)

Data Set:
Date: 10/28/20 Time: 17:09:35

PROJECT INFORMATION

Company: HDR
Client: Xcel Energy
Project: 10025968
Location: Comanche Station
Test Well: W-7
Test Date: 10/14/2020

AQUIFER DATA

Saturated Thickness: 16.53 ft

WELL DATA (W-7)

Initial Displacement: 0.8023 ft
Total Well Penetration Depth: 16.53 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 16.53 ft
Screen Length: 15. ft
Well Radius: 0.2083 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model
Kr = 0.0003313 cm/sec
Kz/Kr = 1.
Ss = 0.01114 ft^{-1}